ROHDE & SCHWARZ
MÜNCHEN

Manual

# RUBIDIUM FREQUENCY STANDARD XSRM

238.4011.02

R 34427 - 1

CASE 1 SET 215

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Translations

# 1. Characteristics

## 1.1 Uses

The Rubidium Frequency Standard XSRM 238.4011.02 supplies a sinusoidal 5-MHz output voltage whose frequency is very accurate, stable and of high spectral purity. A very high short-term stability and extremely low long-term drift are ensured by the regulation of a highly stable crystal oscillator using the rubidium resonance frequency for reference. Effects of temperature variation and external magnetic fields are suppressed since the elements that are responsive to such influences are protected by ovens or mumetal shields.

The XSRM can be used as a frequency standard wherever control with extreme stability and spectral purity of the frequency is required. Fields of application are, for example, space research, extraterrestrial radio communications, geodesy and radio-navigation, microwave spectroscopy, radar, control of TV transmitters with precision offset and of standard-frequency and standard-time systems.

Apart from the spectral lamp, the XSRM does not contain components that are subject to wear. The spectral lamp has an average life expectancy of more than, five years. It can be replaced within a few minutes without requiring the set to be switched off.

## 1.2 Description

(see block diagram Fig. 1-1)

The XSRM uses the atomic resonance frequency, 6.834 682 641 GHz, of rubidium 87, which is extremely precise and scarcely influenced by ambient conditions, to regulate a highly stable 5-MHz oscillator. A cylindrical resonant cell which is surrounded by a cavity resonator is filled with a mixture of rubidium vapoir and inert gas. A spectral lamp containing the same mixture is excited by an RF generator and its light falls on a photo-diode after having passed through the resonant cell.

If the cavity resonator is excited such that a high-frequency magnetic field with the rubidium resonance frequency builds up in the longitudinal direction of the resonant cell, the light attenuation of the resonant cell increases and the photo diode current decreases. The frequency at which light attenuation occurs can be slightly varied by means of an adjustable DC magnetic field parallel to the resonant cell. The effect of ambient temperature on the resonant cell and spectral lamp is virtually suppressed by ovens.

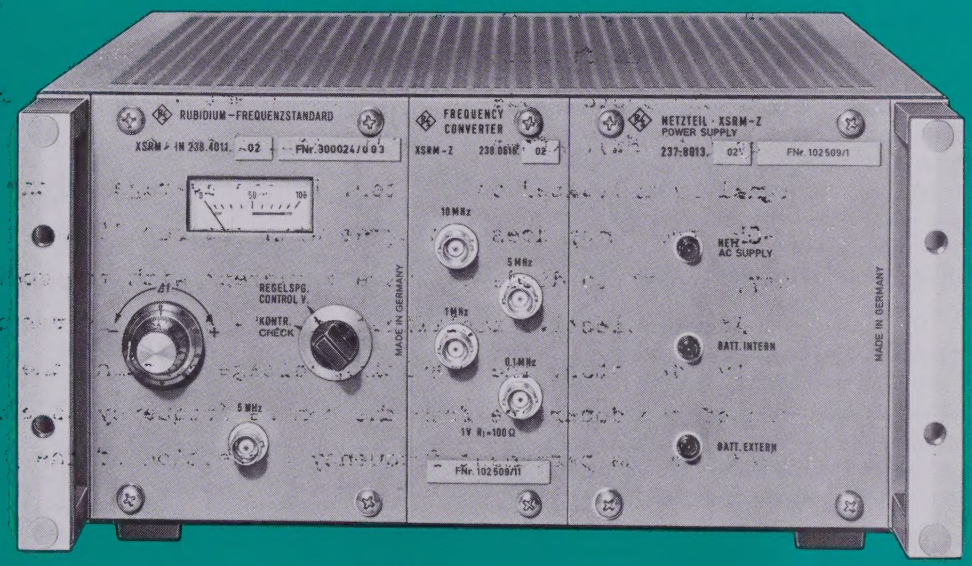
The resonance frequency of 6.834.. GHz is excited by a storage varactor diode which is controlled by a synthesizer. The synthesizer input frequency comes from a 5-MHz oscillator with extreme frequency stability. The synthesizer output signal, and thus also the 6.834..-GHz frequency in the cavity resonator, is phase modulated with 82 Hz. When the average of the modulated 6.834..-GHz frequency exactly agrees with the rubidium resonance frequency, the photo diode supplies a current with twice the modulation frequency (164 Hz). After selective amplification and detection this signal is indicated on a meter. If the average of the modulated 6.834..-GHz frequency does not agree with the rubidium resonance frequency, the photo diode delivers a current with the modulation frequency (82 Hz). After selective amplification this signal is rectified with a phase-sensitive detector. The resulting voltage contains the magnitude and phase of the departure from the centre frequency as control criteria. It is used for the permanent frequency correction of the 5-MHz crystal stage.

The XSRM consists of four functional groups: resonance unit, RF unit, AF unit and 5-MHz crystal oscillator. The set is operated with a DC voltage which may lie between 22 V and 32 V. A power supply with a built-in battery, a frequency converter with the output frequencies 10 MHz, 5 MHz, 1 MHz and 100 kHz, a phase comparator and a standard-frequency receiver can be supplied upon request.

ROHDE&SCHWARZ

XSRM

# RUBIDIUM FREQUENCY STANDARD




## SPECIAL FEATURES

- High frequency stability and accuracy
- Standby power supply
- Output frequencies 10 MHz, 5 MHz, 1 MHz, 100 kHz
- Automatic performance check by meter and remote alarm provisions
- Small size and light weight
- Modular construction

## FIELDS OF APPLICATION

- Control of standard-frequency and standard-time systems
- Calibration of counters, synthesizers and crystal oscillators
- Microwave spectroscopy
- Control of transmitters
- Mobile and fixed radio navigation systems
- Satellite reception
- Geodesy

Data sheet
238401
E – 4

## Modular Standard-frequency System

Rohde & Schwarz have been building standard-frequency and standard-time equipment for more than 40 years. The continuous development of higher accuracy has been accompanied by an appreciable reduction in size and price. A modular system based on the **Rubidium Frequency Standard** is another step in this direction.

The use of the most modern technology has resulted in the production of an instrument at a very moderate price and of extremely compact construction.

## Characteristics and Uses

### XSRM

For many applications the accuracy of a crystal oscillator is insufficient. In particular, the frequency drift due to aging, unavoidable with crystals, produces errors which can add up in a short time to a relatively high total. This means that regular recalibration is necessary. The Rubidium Frequency Standard is eminently suitable for the recalibration of crystal oscillators.

The long-term stability of the XSRM is more than 100 times higher than that of the best crystal oscillators, assuring an adequate **accuracy reserve**. The XSRM is an indispensable instrument in the standard equipment of every calibration laboratory where crystal-controlled sets such as counters and synthesizers must be checked. The generation of calibration frequencies, which are needed in every test department, can also be controlled through the use of an XSRM.

In many cases it is more practical to use an XSRM direct in place of a crystal oscillator. In this way the work of recalibration is eliminated and a signal of the highest accuracy is assured. Signals of this accuracy are required in the fields of communications technology, radio navigation and standard frequency technology, to name but a few. Typical examples are the control of TV transmitters with precision offset and the control of standard-time systems and digital data networks.

When continuous operation is required, it is advisable to use the standby **power supply**, which automatically takes over and delivers the operating voltage in the case of an AC supply failure. Recharging of the accumulator from the AC supply is also automatic.

The basic XSRM unit delivers an output frequency of 5 MHz with a signal-to-noise ratio greater than 125 dB. Other comparison or control frequencies are, however, frequently required. For this purpose a **frequency converter** can be added which delives the frequencies 10, 5, 1 MHz and 100 kHz, thus providing the most important standard frequencies.

The combination of XSRM (reference-frequency source) and **Phase Comparator XSRM-Z3** recommends itself for checking and recalibrating control frequencies.

Since the system is divided into modules – XSRM, power supply, frequency converter, phase comparator – it can easily be adapted to meet different requirements. This possibility and low cost result in an advantageous price/performance relationship.

For fixed operation, the modules can be fitted into a 19″ rack adapter. A cabinet is also available which accommodates the XSRM, power supply and frequency converter or phase comparator, thus providing a compact and portable atomic frequency standard.

In addition to its excellent performance characteristics, the XSRM is notable for its **extreme reliability**. This characteristic is of vital importance, particularly where the fail-safe functioning of a TV transmitter is concerned. The frequency drift due to aging is less than $1 \times 10^{-11}$ per month (typ. $8 \times 10^{-12}$ per month). Any variation in frequency can be corrected by a precision potentiometer on the front panel of the set and via a control-voltage input. With automatic frequency control of the XSRM from the Standard Frequency Receiver XKE 2 (data sheet 291 001), the long-term frequency drift over any period of time is approx. $2 \times 10^{-11}$, depending on the local receiving conditions.

In addition to its **extremely small drift** the XSRM has **very good short-term stability**, making it especially suitable for buffering caesium frequency standards. This attribute is particularly valuable in standard-time, standard-frequency and calibration laboratories.

Efficient shielding is provided against magnetic fields. The functioning of the instrument, as well as the control voltage, can be checked at any time by the meter on the front panel. Any **failure** is signalled immediately by an **alarm circuit**. Its small size and relatively low current consumption enable the XSRM to be used as a **portable instrument**. A further advantage is its short warm-up time. After only 25 minutes the frequency error is less than $1 \times 10^{-10}$.

## Description

### XSRM

The Rubidium Frequency Standard XSRM makes use of an atomic resonance of Rb 87, an isotope of the alkali metal rubidium. The frequency of a high-quality crystal oscillator is continuously controlled by a criterion derived from the atomic resonance.

While the high-quality crystal oscillator ensures **excellent short-term stability**, use of the atomic resonance makes for **extremely low drift.**

The XSRM is very easy to service. At the end of its useful life the spectral lamp employed in the resonator section can be replaced in less than five minutes.

The XSRM is composed of four subassemblies:

The resonator section consists of the spectral lamp and resonator, each housed in an oven. This subassembly is electrically and magnetically shielded. The RF section, AF section and crystal oscillator are contained in three separate chassis which can be readily removed.

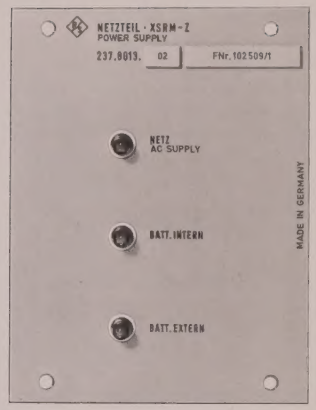
Rubidium Frequency Standard XSRM

The XSRM basic unit operates from a DC supply. The built-in stabilizing circuit handles voltages varying from 22 to 32 V, thus permitting connection to any conventional battery.

## Extension Units for XSRM

### Power Supply XSRM-Z

The standby power supply contains a maintenance-free NiCd accumulator, which in the event of an AC supply failure can supply power to the XSRM for about one hour at a normal ambient temperature. It delivers a maximum current of 1.6 A. A priority circuit ensures that this current is first supplied only to the frequency standard (e. g. XSRM) to allow warm-up and that the other loads are connected after the warm-up period is over.




Power Supply

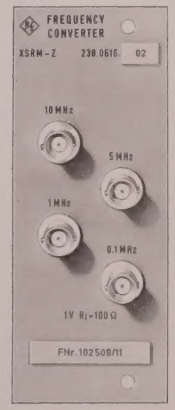
The accumulator is automatically recharged from the AC supply; switchover from AC to battery operation is also automatic.

An angle-of-current-flow control ensures high efficiency, so that the standby power supply develops very little heat. The mode of operation is indicated by LEDs. A connection for an external battery is provided.

### Frequency Converter XSRM-Z

The frequency converter is driven by the 5-MHz frequency which is delivered from the basic XSRM unit. Parallel-connected outputs are provided on the front and rear panels for the frequencies 10 MHz, 5 MHz, 1 MHz and 100 kHz. All the output signals are sinusoidal and locked in phase with the input signal.

Frequency Converter




The frequency converter can also be operated from the standby power supply.

Up to ten Frequency Converters XSRM-Z can be connected in parallel to a standard-frequency source for setting up a standard-frequency distribution system.

Rohde & Schwarz also manufactures the HF Multicoupler NV 14 T (10 outputs, 50 Ω, 0 dB; data sheet N2–198) and the Video Distribution Amplifier AVF (5 or 10 outputs, 75 Ω, gain adjustable between –6 and +6 dB; see data sheet 136 010).



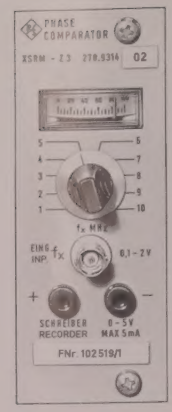
### Phase Comparator XSRM-Z3

The Phase Comparator XSRM-Z3 is used for **checking and recalibrating control frequencies**, derived for instance from crystal oscillators in counters and synthesizers.

Any **5-MHz source** of appropriate accuracy, such as the Rubidium Frequency Standard XSRM whose long-term frequency drift ($8 \times 10^{-12}$/month) is more than 100 times lower than that of the best crystal oscillators, can be used as the reference. Frequency differences between $1 \times 10^{-6}$ to $1 \times 10^{-9}$ can be determined directly on the **panel meter.**

The **recorder output** permits considerably smaller errors to be logged or **frequency and phase deviations** to be recorded over longer periods of time.

Any test items with a frequency of 1 MHz or an integral multiple thereof (up to 10 MHz) can be measured. A rotary switch on the front panel permits the phase comparator to be set to the corresponding input frequency.




Phase Comparator

The combination of the phase comparator with the Rubidium Frequency Standard XSRM and the Power Supply XSRM-Z is a simple but reliable test system for use in calibration laboratories.

## Specifications

### Rubidium Frequency Standard XSRM

| | |
|---|---|
| Output frequency | 5 MHz (sinusoidal) |
| Output EMF | 1 $V_{rms} \pm 10\%$ |
| | $Z_{out} =$ 50 Ω ± 10% (rear socket) |
| | $Z_{out} =$ 100 Ω ± 10% (front-panel socket) |
| Connectors | BNC, female |
| Harmonics | > 40 dB down |
| S/N ratio (at ≧ 100 Hz from carrier) | ≧ 125 dB (1 Hz bandwidth) |
| Non-harmonics | ≧ 120 dB down |
| Frequency error | |
| Long-term drift | ≦ $1 \times 10^{-11}$/month (typ. $8 \times 10^{-12}$/month) |
| Short-term error (standard deviation) | ≦ $3 \times 10^{-12}$ with $\tau = 1$ s |
| Effect of ambient temperature | ≦ $2 \times 10^{-12}$/° C |
| Effect of operating voltage | ≦ $2 \times 10^{-11}$/10% |
| Permissible ripple of supply voltage | 1 $mV_{rms}$ |
| Effect of external magnetic field | ≦ $2 \times 10^{-13} / \frac{A}{m}$ |
| Effect of atmospheric pressure (0 to 10,000 m altitude) | ≦ $5 \times 10^{-13}$/mbar |
| Frequency correction | |
| Mechanical (by potentiometer) | $2 \times 10^{-9}$ |
| Setting error | ≦ $5 \times 10^{-12}$ |
| Electrical (via control input) | $1 \times 10^{-9}$ (V = 0 to + 10 V) |
| Warm-up time for frequency error $\frac{\Delta f}{f} < 10^{-10}$ | typ. 25 min at 25 °C |

**General data**

| | |
|---|---|
| Nominal temperature | –20 to +45 °C |
| Shelf temperature | –40 to +70 °C |
| Power supply | 22 to 32 V DC (minus to chassis) |
| Current drain | max. 1.5 A during heating (heating period < 15 min) |
| | approx. 0.7 A in operation (at 24 V, +25 °C) |

## Specifications

### Rubidium Frequency Standard XSRM (continued)

| | |
|---|---|
| Overall dimensions (W x H x D) (plug-in unit) | 100 mm x 132 mm x 390 mm |
| Weight | 3.7 kg |
| Colour | front panel: grey RAL 7035 |

**Accessories supplied**

| | |
|---|---|
| 1 connecting cable, 3-pole (1 x Lemo connector, 3 x banana plugs) | 238.8123.00 (alarm signal) |
| 2 connecting cables, 2-pole[1]) (1 x Lemo connector, 2 x banana plugs) | 238.8130.00 (battery, regulation) |
| 1 connecting cable, 2-pole (2 x Lemo connector) | 291.0875.00 (standby power supply) |

### Power Supply XSRM-Z

| | |
|---|---|
| Input voltage | 230/115 $V_{rms}$ ±20% (47 to 440 Hz) |
| Power consumption | max. 70 VA |
| Input for additional battery (input voltage) | 24 to 28 V |
| DC output | |
| Voltage with AC operation | 23 V, regulated |
| Voltage with battery operation | 22 to 30 V |
| Max. output current | 1.6 A (2 A for ≦15 min) |
| Battery capacity | 0.8 Ah |
| Mean backup time (e. g. with XSRM) at 25 °C | 1 hour |

**General data**

| | |
|---|---|
| Nominal temperature | –20 to +45 °C |
| Shelf temperature | –20 to +50 °C |
| Dimensions (W x H x D) (plug-in unit) | 101 mm x 132 mm x 369 mm |
| Weight | 5.2 kg |
| Colour | front panel: grey RAL 7035 |

**Accessories supplied**

| | |
|---|---|
| 1 power cord | 025.2365.00 |
| 1 connecting cable, 2-pole[1]) (1 x Lemo connector, 2 x banana plugs) | 238.8130.00 |

### Frequency Converter XSRM-Z

**Input**

| | |
|---|---|
| Frequency | 5 MHz |
| Permissible input level range | 0.2 to 2 $V_{rms}$ |
| Input impedance | ≧500 Ω |
| Connector | BNC, female |

**Outputs**

| | |
|---|---|
| Frequencies | 0.1 MHz, 1 MHz, 5 MHz, 10 MHz |
| Output voltage | 1 $V_{rms}$, sinusoidal |
| Harmonics | >30 dB down |
| Isolation between outputs of different frequency | >60 dB |
| Output impedance | |
| Front panel outputs | 100 Ω (BNC sockets, decoupled by 50 Ω from rear outputs) |
| Rear outputs | 50 Ω (VSWR <2, BNC sockets) |

**General data**

| | |
|---|---|
| Nominal temperature | –20 to +45 °C |
| Shelf temperature | –40 to +70 °C |
| Connectors | 1 BNC connector per frequency on front panel and at rear |

[1]) For connection of external battery only.



## Specifications

### Frequency Converter XSRM-Z (continued)

| | |
|---|---|
| Supply voltage | 22 to 32 V DC |
| Current drain | max. 90 mA |
| Dimensions (W x H x D) and weight | 50 mm x 132 mm x 374 mm, 1 kg |
| Colour | front panel: grey RAL 7035 |

**Accessories supplied**

| | |
|---|---|
| 1 connecting cable, 2-pole (2 x Lemo connector) | 291.0875.00 (standby power supply) |
| 1 connecting cable, 2-pole[1]) (1 x Lemo connector, 2 x banana plugs) | 238.8130.00 |
| 1 connecting cable with BNC connectors, 37.5 cm long | 214.5718.00 |

### Phase Comparator XSRM-Z3

| | |
|---|---|
| **Input frequency $f_{st}$** | 5 MHz |
| Input voltage range | 0.1 to 2 $V_{rms}$ |
| Input impedance | >100 Ω |
| Connector | BNC, female (rear side) |
| **Input frequency $f_x$** | 1 to 10 MHz |
| Steps | 1 MHz |
| Input voltage range | 0.1 to 2 $V_{rms}$ |
| Phase measurement range | |
| $\frac{\Delta f_x}{f_x}$ for 1 s running time | $10^{-6}$ |
| Indication of phase difference | 0 to 1 µs (on built-in multimeter) |
| **Recorder output** | |
| Output voltage | 0 to 5 V corresp. to phase difference of 0 to 1 µs |
| Output current | 5 mA max. |
| Output impedance | >10 Ω |
| Connector | 4-mm telephone jack |
| **General data** | |
| Nominal temperature | –20 to +45 °C |
| Shelf temperature | –40 to +70 °C |
| Connector | Lemo socket |
| Supply voltage | 22 to 32 V DC |
| Current drain | max. 180 mA |
| Overall dimensions (W x H x D) and weight | 50 mm x 132 mm x 384 mm, 0.9 kg |
| Colour | front panel: grey RAL 7035 |

**Accessories supplied**

| | |
|---|---|
| 1 connecting cable, 2-pole (2 x Lemo connector) | 291.0875.00 (for standby power supply) |
| 1 connecting cable, 2-pole[1]) (1 x Lemo connector, 2 x banana plugs) | 238.8130.00 |
| 1 connecting cable with BNC plugs, 37.5 cm long | 214.5718.00 |

### ORDER DESIGNATIONS

| | |
|---|---|
| Rubidium Frequency Standard XSRM | ► 238.4011.02 |
| Power Supply XSRM-Z | ► 237.8013.02 |
| Frequency Converter XSRM-Z | ► 238.0616.02 |
| Phase Comparator XSRM-Z3 | ► 278.9314.02 |
| Standard Frequency Receiver XKE 2 | ► 291.0017.02 |
| 19″ rack adapter | ► 237.6840.02 |
| 19″ cabinet | ► 237.7317.02 |
| Cabinet (width 5/8 of 19″) for XSRM with power supply and frequency converter or phase comparator | ► 237.6040.02 |

Note: The XSRM is also available as an OEM version (see XSRB data sheet 216 021).

[1]) For connection of external battery only.

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## 2. Preparation for Use and Operation

### 2.1 Legend for Operating Controls

(see Figs. 2-1 and 2-2)

| No. | Engraving | Function |
|---|---|---|
| 1 | | Meter for the indication of the resonance signal and of the control voltage for the 5-MHz oscillator; the indication is selected with switch 2 :<br>In the CHECK position the pointer of the meter must deflect to the green range.<br>In the CONTROL V. position the pointer must not be in the red range. |
| 2 | CONTROL V.<br>CHECK | Switch selecting the indication of the control voltage or of the resonance signal on meter 1 . |
| 3 | 5 MHz | 5-MHz output, in parallel with 13 .<br>$V_{rms}$ = 1 V ±10%; $Z_{out}$ = 100 Ω ±10%. |
| 4 | | Decade knob for frequency adjustment;<br>range: $\Delta f/f = 2 \times 10^{-9}$ ±10%. |
| 5 | | Lever for locking the decade knob 4 . |
| 6 | | Screwdriver adjustment for tuning the 5-MHz oscillator |
| 7 | | Lamp extractor. |
| 8 | | Retaining screws for lamp wrench. |

| No. | Engraving | Function |
|---|---|---|
| 9 | INPUT<br>22 - 23 V= | Connector for voltages supply to the XSRM. The voltage may be between 22 V and 32 V. With 22 V, the unit has its lowest power consumption.<br>Note: When the polarity of the supply voltage is wrong, fuse Si1 blows. The negative input terminal is connected to the frame of the unit. |
| 10 | | Hole through which the spectral lamp can be changed. |
| 11 | ⊥ +<br>INP. 0...+10 V=<br>FREQ.-CONTR. | Socket for application of a DC voltage of 10 V, max. for remote frequency adjustment.<br>A change in voltage between 0 and 10 V corresponds to a change in frequency of $1 \times 10^{-9}$. |
| 12 | ALARM | Output for monitoring the resonance signal. The changeover contact responds when the resonance signal falls short of a predetermined value. |
| 13 | 5 MHz<br>1 V, $R_i$ = 50 Ω | 5-MHz output in parallel with 3 .<br>$V_{rms}$ = 1 V ±10 %;<br>$Z_{out}$ = 50 Ω ±10 % . |
| 14 | Si1<br>T2, 5D | Fuse |

## 2.2 Preparation for Use

### 2.2.1 Voltage Supply

The simplest way of operating the XSRM is from the associated power supply with built-in battery. But any DC voltage source which fulfils the following conditions may be used as well:

Voltage ..... 22 V to 32 V
AC voltages (hum)
superimposed on the DC voltage .... $V_{pp} < 1$ mV
Current ..... max. 1.8 mA

The supply voltage should be near 22 V in order to keep the power consumption of the XSRM (heat) as low as possible, although the technical data specified under 1.3 remain unchanged even in permanent operation from 32 V.

To maintain highest frequency accuracy, the supply voltage should not be subject to appreciable short-term fluctuations (> 1%/min). Slow variations, such as involved in the discharging of batteries (< 1%/min), do not affect the frequency accuracy. The frequency error remains $< 2 \times 10^{-11}$ for a 10% voltage variation.

Note: If by mistake the XSRM is connected to the voltage source with wrong polarity, fuse Si1 responds. After replacement of the defective fuse the unit is again ready to operate. The minus pole of the XSRM is connected to the frame. Therefore, only voltage sources with floating outputs or with the minus terminal taken to chassis can be used.

### 2.2.2 Setting Up

The frequency error specified under 1.3 is valid only in fixed operation. Heavy shocks and prolonged vibrations may cause an increased error. For use in vehicles the XSMR should be provided with a suitable shock mount.

## 2.3 Operation

### 2.3.1 Putting into Operation

The XSRM is normally used in permanent operation and therefore has not been provided with an on/off switch. It is put into operation by connecting the voltage source. When switch 2 is in the CONTROL V. position, meter 1 indicates whether the operating voltage is present and Si1 14 intact.

### 2.3.2 Warmup Time

Immediately after switching on, the XSRM delivers the corresponding frequency at both outputs. Since, however, the oven for the crystal oscillator and the two ovens in the resonance unit are still cold, the 5-MHz output frequency may differ by up to $4 \times 10^{-5}$ from its nominal value. After a warmup time of about 35 minutes, the output-frequency check by the atomic resonance frequency takes effect. This is recognized by the fact that in position CHECK of switch 2 the pointer of meter 1 is within the green range. When switch 2 is at CONTROL V., the pointer of meter 1 must deflect to the interval between the two red ranges. If the set has not been operated for an extended period of time the output frequecy may differ from the nominal value. For a high absolute frequency adjust the XSRM according to section 3.2.3.

### 2.3.3 Checking

The values indicaded by meter 1 in both positions of switch 2 should be noted regularly, for example every month. Any variations, which may indicate defective components, are thus readily recognized by referring to the values measured earlier. The indication obtained in the CHECK position of switch is of particular importance since it allows the functional check of almost any part of the XSRM.

A decrease in the resonance signal level generally indicates that the spectral lamp is worn out. If the resonance signal becomes too weak, a monitoring circuit actuates a relay (ALARM output 12). If in the CONTROL V. position of switch 2 the pointer of meter 1 approaches either of the red ranges, the crystal oscillator must be readjusted.

# 3. Maintenance

## 3.1 Required Measuring Instruments

| No. | Instrument | Type recommended | Ident-No. | See section |
|---|---|---|---|---|
| 1 | Phase recorder | XKP | 100.5666... | 3.2.3 |
| 2 | Frequency standard with accuracy $\frac{\Delta f}{f} \leq 1 \cdot 10^{-10}$ | | | 3.2.3 |
| 3 | Oscilloscope | Tektronix 454 | 454 A | 3.2.2 |

## 3.2 Performance Check

### 3.2.1 Basic Functional Check

Set switch 2 (Fig. 2-1) first to CHECK then to CONTROL V. The pointer of meter 1 must deflect as follows:

| Switch position | Deflection on meter 1 |
|---|---|
| CHECK | within green mark |
| CONTROL V. | between the ranges which are marked in red |

(see also section 2.3.3).

### 3.2.2 Checking the Output Voltage

Measure the voltage at the 5-MHz output 13 (Fig. 2-2) at the rear of the unit. It must be 1 $V_{rms}$ $\pm$10% with no load connected.

### 3.2.3 Checking the Output Frequency

The test setup is shown in Fig. 3-1. It must be possible to adjust the frequency of the XSRM to an accuracy of $\pm 1 \times 10^{-10}$ referred to the reference frequency using potentiometer 4 (Fig. 2-1). The knob of this potentiometer should indicate between 200 and 800 scale divisions after the adjustment has been completed.

With the aid of the XKP, the XSRM can, of course, be adjusted to, say, $\frac{\Delta f}{f} < \pm 1 \times 10^{-11}$ if a reference frequency with such a small error is used.

A frequency error of $< \pm 1 \times 10^{-11}$ results in a phase shift of $< 36$ nsec for a measurement duration of 1 h. The frequency error can be determined from the slope of the trace recorded by the XKP (see manual of Phase Recorder XKP).

### 3.2.4 Adjusting the 5-MHz Crystal Oscillator

If during the functional check according to section 3.2.1 while switch 2 is in the CONTROL V. position the pointer of meter 1 goes to either of the ranges marked in red, then the 5-MHz crystal oscillator requires readjustment. This is carried out by means of capacitor C34 which is accessible through the hole 6 . Adjust in very small steps - about 1/8 turn - since the time constant of the adjustment amounts to several seconds.

Adjust so that the pointer of meter 1 deflects approximately to mid-scale.

### 3.2.5 Replacing the Spectral Lamp

If during the functional check according to section 3.2.1 the pointer of meter 1 (Fig. 2-1) fails to attain the green mark while switch 2 is in position CHECK, this may indicate that the spectral lamp is defective. Replace the lamp to check this. The spectral lamp has an average life expectancy of more than five years.

The lamp is accessible through the hole 10 with lamp extractor 7. Turn the lamp anticlockwise to remove it. Take care that the lamp is not screwed too tightly, the maximum permissible torque being 1 cmkp.

It is advisable that the instrument be not switched off during the replacement of the lamp so that it is again ready to operate after a few minutes. A slight frequency shift of about $\pm 1 \times 10^{-10}$ may, however, occur.

When the spectral lamp is defective and during the replacement of the lamp the output frequency presents an error which is equal to the error of the built-in crystal oscillator and may amount to $2 \times 10^{-7}$.

After the spectral lamp has been exchanged, check according to section 2.3.3.

## 3.3 Storage

The instrument should be stored under the following conditions:

Shelf temperature ..... $-40^{\circ}C$ to $+70^{\circ}C$
Relative humidity ..... < 80%

## 4. Circuit Description

### 4.1 5-MHz Crystal Oscillator

Circuit diagram 238.7285 S

The frequency-determining element is a 5-MHz overtone crystal of highest precision (Q30) which is excited in series resonance by a low-noise oscillator T31, T32. The amplitude of the crystal oscillation is kept constant by an AGC amplifier (T33, Gl 35, Gl 36). The oscillator frequency can be varied within narrow limits by trimmer capacitors (C34, C35) and a varactor (Gl 33). The control voltage for the varactor comes from the AF unit (238.4411 S).

The crystal and the varactor are housed in an oven in order to minimize the effect of the ambient temperature on the oscillator frequency. The temperature in the oven is stabilized by a thermostat (R1, B1, B2, T1).

The effect of the supply voltage on the oscillator frequency is largely eliminated by a voltage regulator (B3, T2, T3). A buffer amplifier (T34, T35) decouples the two signal outputs of the crystal oscillator.

### 4.2 RF Unit

Circuit diagram 238.5001 S

The signal delivered by the 5-MHz crystal oscillator (238.7285 S ST10) is brought to 10 MHz by T1, T2 and then to 30 MHz by the limiting amplifier T3, T4.

The 30-MHz signal is phase-modulated by means of varactors (Gl 2, Gl 3) and a 82-Hz signal from the AF unit (238.4411 S ST15).

The phase-modulated 30-MHz signal is boosted again by the subsequent limiting amplifier (T5, T6) and fed to the driver (T7, T8) which drives the final stage (T16) to full output.

The 10-MHz-signal furthermore drives a 2:1 frequency divider (B4) and a 63:2 frequency divider (B1, B2, B3) via transistor T9. The signal coming from the 63:1 divider

$$\frac{10 \times 2}{63} \text{ MHz} = 0.317... \text{ MHz}$$

is selectively boosted in a limiting amplifier (T11, T12) and mixed with the 5-MHz signal from the 2:1 frequency divider in a mixer (T13, T14, T15).

The 5.317...-MHz signal thus available at the output controls, in conjunction with the 30-MHz signal, the varactor diode of the resonance unit (238.5501 S, Gl 71). The amplitude of the 5.317...-MHz signal can be adjusted with resistor R31, the operating point of the varactor diode with resistor R29.

## 4.3 AF Unit

Circuit diagram 238.4411 S

The 82-Hz and 164-Hz signals delivered by the photo diode of the resonance unit (238.5501 S, Gl 70, ST8) are selectively amplified in the AF unit (82-Hz amplifier B2, B3 ;164-Hz amplifier B4, B5). A phase-sensitive detector (T5), an integrator (B8) and a non-linear amplifier (B9) derive from the 82-Hz signal a voltage which is used to control the frequency of the 5-MHz crystal oscillator (238.7285 S).

The rectified 164-Hz signal (Gl 3) controls a monitoring relay (Rs1) with the aid of a transistor (T2). The relay contact is brought out at the rear of the instrument (Bu22 ALARM). The 164-Hz signal and the control voltage for the 5-MHz crystal oscillator are indicated by a front-panel meter (J1) (238.4011 S).

A 82-Hz generator (B6, B7, T3, T4) delivers a squarewave voltage which controls the phase-sensitive detector (T5) and a triangular voltage which is used in the RF unit (238.5501 S) as the modulation voltage for the varactors (Gl 2, Gl 3).

## 4.4 Resonance Unit

Circuit diagram 238.5501 S

The resonance unit comprises the frequency-determining elements: resonant cavity and spectral lamp. The resonant cavity is contained in a resonator

which is tuned to 6.834... GHz and kept at a constant temperature by a thermostat (B1, B2, B3, T1, R70).

The resonator is excited via a coupling loop by a storage varactor diode (G1 71) which is driven from the RF unit (238.5001 S).

The constant magnetic field required for the atomic resonance is produced by a coil (L70) which is wound around the resonator. The nominal value of the magnetic field can be adjusted with the resistors R23 to R27. A photo diode (G1 70) located at the front of the resonator converts the light variation which occurs during operation into an electrical signal. This signal is then processed in the AF unit (238.4411 S).

A 100-MHz oscillator (T80, L81, C80) causes the spectral lamp R1 1 to light. Its temperature is stabilized by a thermostat (B30, B80, T30).

The resonance unit also contains voltage regulators (B50, T50, T51 with 19.5 V output and B51, T52 with 5 V output) for the supply of the individual units.

## 4.5 Mechanical Construction

The XSRM consists of four subassemblies which are accommodated on a chassis. Each subassembly can readily be removed by undoing a few screws and unplugging the connectors. The screws are accessible when the bottom cover is removed (4 screws). The position of the screws and connectors can be seen in Fig. 4-1.

In the AF unit and RF unit, all components are accessible after 2 cover plates have been removed (Fig. 4-2).

The resonance unit and the 5-MHz crystal oscillator are accommodated in mumetal cases which are secured by 3 and 4 screws, respectively. When the cases are removed, all components are readily accessible (Fig. 4-2).

Note

Mumetal is susceptible to shocks. Strong mechanical stress considerably deteriorates the magnetic shielding effect of mumetal. The cases should therefore be handled with great care.

# 5. Repair Instructions

## 5.1 Required Measuring Instruments

| No. | Instrument | Type recommended | Ident-No. | See section |
|---|---|---|---|---|
| 1 | Decade RF Signal Generator | | | 5.3.1<br>5.3.2<br>5.3.4 |
| 2 | Oscilloscope | Tektronix 454 | 454 A | 5.3.1<br>5.3.2<br>5.3.3<br>5.3.4 |
| 3 | Millivoltmeter | UVN | 100.0160.02 | 5.3.1 |
| 4 | Wave Analyzer | FAT 3 | 100.3702.92 | 5.3.1 |
| 5 | Digital Multimeter | UGWD | 100.0218.02 | 5.3.3<br>5.3.4 |
| 6 | UHF Millivoltmeter | URV | 100.0130.02 | 5.3.2<br>5.3.4 |
| 7 | Thermometer | Metratast P1 Fa. Metra-watt) | | 5.3.3<br>5.3.4 |

## 5.2 Fault Location

### 5.2.1 No 5-MHz Output Signal

Check the fuse Si1 ( 14 in Fig. 2-2) and the supply voltage. If Si1 has blown, check the polarity of the supply voltage. Wrong polarity causes the fuse to blow. See also section 2.2.1.

Check the plug-and-socket connection to the 5-MHz crystal oscillator (Y4, 238.7285 S).

Check the 5-MHz crystal oscillator (Y4, 238.7285 S, section 5.3.4).

Check the voltage regulator (B3, T2, T3) in the crystal oscillator.

Check the oscillator (T31, T32, T33).

Check the output amplifier (T34, T35).

### 5.2.2 No Resonance Signal

The meter 1 shows no deflection in position CHECK of switch 2 (Fig. 2-1).

Note:

The resonance signal appears only after a warm-up time of about 40 minutes.

Check the 5-MHz output signal. If this signal is missing, proceed according to section 5.2.1.

#### 5.2.2.1 Spectral Lamp Does Not Light

Replace lamp. It should light after 5 minutes at the latest.

Check the resonance unit (Y3, 238.5501 S). (See also section 5.3.3).

Check the temperature in the lamp thermostat (B30, B80, T30).

Check the voltage regulator for 20 V (B50, T50, T51).

Check the lamp generator (T80, L80, L82, C80).

#### 5.2.2.2 Spectral Lamp Lights

Note

Spectral lamp may be lit even when defective (krypton are discharge only lights).

Check the plug-and-socket connections of the individual subassemblies.

Check the frequency of the 5-MHz crystal oscillator (Y4, 238.7285 S). Max. frequency error $\pm 1 \times 10^{-7}$.

Check the RF unit (Y2, 238.5001 S).

Check the AF unit (Y1, 238.4411 S).

### 5.2.3 Output Frequency is Faulty

#### 5.2.3.1 Frequency Error $\frac{\Delta f}{f} < 2 \times 10^{-9}$

Correct the frequency with potentiometer R1 ( 4 in Fig. 2-1); see also section 3.2.3.

#### 5.2.3.2 Frequency Error $\frac{\Delta f}{f} > 2 \times 10^{-9}$

Check the oscillator control voltage.

When switch 2 (Fig. 2-1) is in position CONTROL V., the pointer of meter 1 should not be within the red scale range. If it is, readjust the 5-MHz crystal oscillator according to section 3.2.4.

## 5.3 Adjustment

### 5.3.1 AF Unit Y1

(see circuit diagram 238.4411 S, drawing 238.4563 Bl. 2)

AF generator (B6, B7, T3, T4).

Adjust generator frequency to 82 Hz ±0.1 Hz using R32.

Adjust symmetry of triangular voltage (ST15) using R25.

The even-numbered harmonics (164 Hz, 328 Hz, etc.) must be at least 80 dB below the fundamental.

AF amplifier (B2, B3).

Apply a signal of 82 Hz ±0.1 Hz via 1 MΩ to ST16.

Adjust B2 using R8 and then B3 using R12 for maximum voltage.

1 mV applied at the input must yield 1.5 V ±0.3 V at the output of B3 (point 6).

If no input signal is applied, the maximum permissible noise signal at the output of B3 is 30 mV.

Apply a signal of 164 Hz ±1 Hz and 100 mV to the amplifier.
The signal at the output of B3 should not exceed 1 V.

AF amplifier (B4, B5).

Apply a signal of 164 Hz ±0.1 Hz via 1 MΩ to ST16.
Adjust B4 using R15 and then B5 using R18 for maximum voltage. 1 mV applied at the input must yield 5 V ±1 V at the output of B5 (point 6).

If no input signal is applied, the maximum permissible noise signal at the output of B5 is 150 mV.

5.3.2 RF Unit Y2

(see circuit diagram 238.5001 S, drawing 238.5147)

Frequency doubler (T1, T2).

Apply a signal of 5 MHz ±1 kHz and 160 mV at ST5.
Adjust the resonant circuit TR1-C3-C4 (10 MHz) for maximum voltage.

Frequency tripler (T3, T4).

Adjust the resonant circuit TR2-C7-C9 (30 MHz) for maximum voltage.

Limiting amplifier (T5, T6).

Adjust the resonant circuits TR3-C10-C11 (30 MHz) and L3-C14-C15-C16 (30 MHz) for maximum voltage, measuring the voltage at the respective secondary winding, in the latter case at C16.

Final stage (T16).

The resonance unit Y3 must be connected for this adjustment. Adjust the resonant circuit L5-C18-C19-C20 (30 MHz) for maximum voltage, measuring the voltage at C20.

Limiting amplifier (T11, T12).

Adjust the resonant circuit TR4-C27-C28 (317... kHz) for maximum voltage, measuring the voltage at the base of T14.

Mixer (T13, T14, T15).

Adjust the resonant circuit TR5-C29-C30 (5.317... MHz) for maximum voltage, measuring the voltage only at the secondary winding.

5.3.3 Resonance Unit Y3

(see circuit diagram 238.5501 S)

The adjustment of the resonance unit, specifically setting the oven temperatures for the resonant cavity and the spectral lamp, requires an elaborate test setup. Should the adjustment become necessary, say, in case of a component failure, we recommend that the XSMR is returned to the R&S factory.

The resonance unit can easily be checked by referring to the circuit description and to the following temperatures:

Oven for resonant cavity +68 °C...+78 °C
Oven for spectral lamp +108 °C±2 °C

5.3.4 5-MHz Crystal Oscillator Y4

(see circuit diagram 238.7285 S, drawings 238.7340 Bl. 2 and 238.7410 Bl. 2)

Oscillator (T31, T32, T33).

Tune the resonant circuit TR30-C32 to 5 MHz using C31. The tuning is correct when the DC voltage at C40 is at maximum.

Thermostat (B1, B2, T1).

The temperature of the thermostat for the crystal oscillator must be set to the zero-coefficient temperature of the crystal (engraved on the crystal oscillator): Set the wiper of R2 to the left stop and allow the crystal oscillator to warm up for about 1 hour. Record the frequency of the crystal oscillator (frequency resolution approximately $1 \times 10^{-9}$).

Varying R2 in steps of about 30° find the oven temperature at which the oscillator frequency reaches a minimum (tolerance $5 \times 10^{-9}$). Following each change of temperature wait until steady-state frequency conditions are established (about 20 minutes).

Adjusting the oscillator frequency (C34, C35).

After temperature has been adjusted, set the oscillator frequency to 5 MHz ±0.05 Hz using C34.

C35 is used to adjust the lock-in range of the oscillator frequency. With a control voltage range of 2.5 to 16.5 V, applied to ST12, it should be 1.5 kHz ±0.1 Hz. Since the two settings affect one another, they should be repeated alternately several times.

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# Bilder
# Figures
# Figures

(R 29500 Bl. 1)
995.1000 Bl. 1

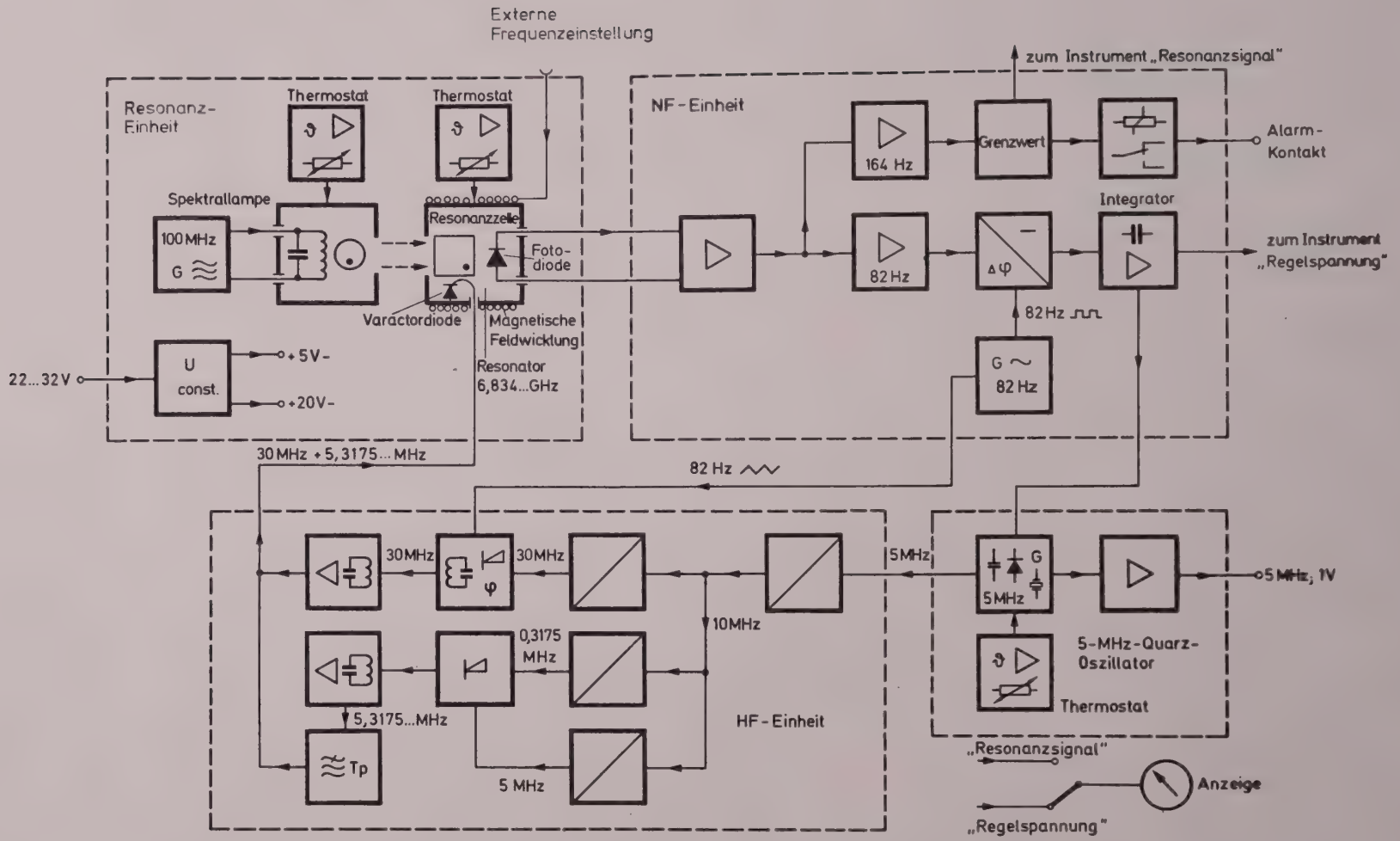


**Bild 1-1 Blockschaltbild**

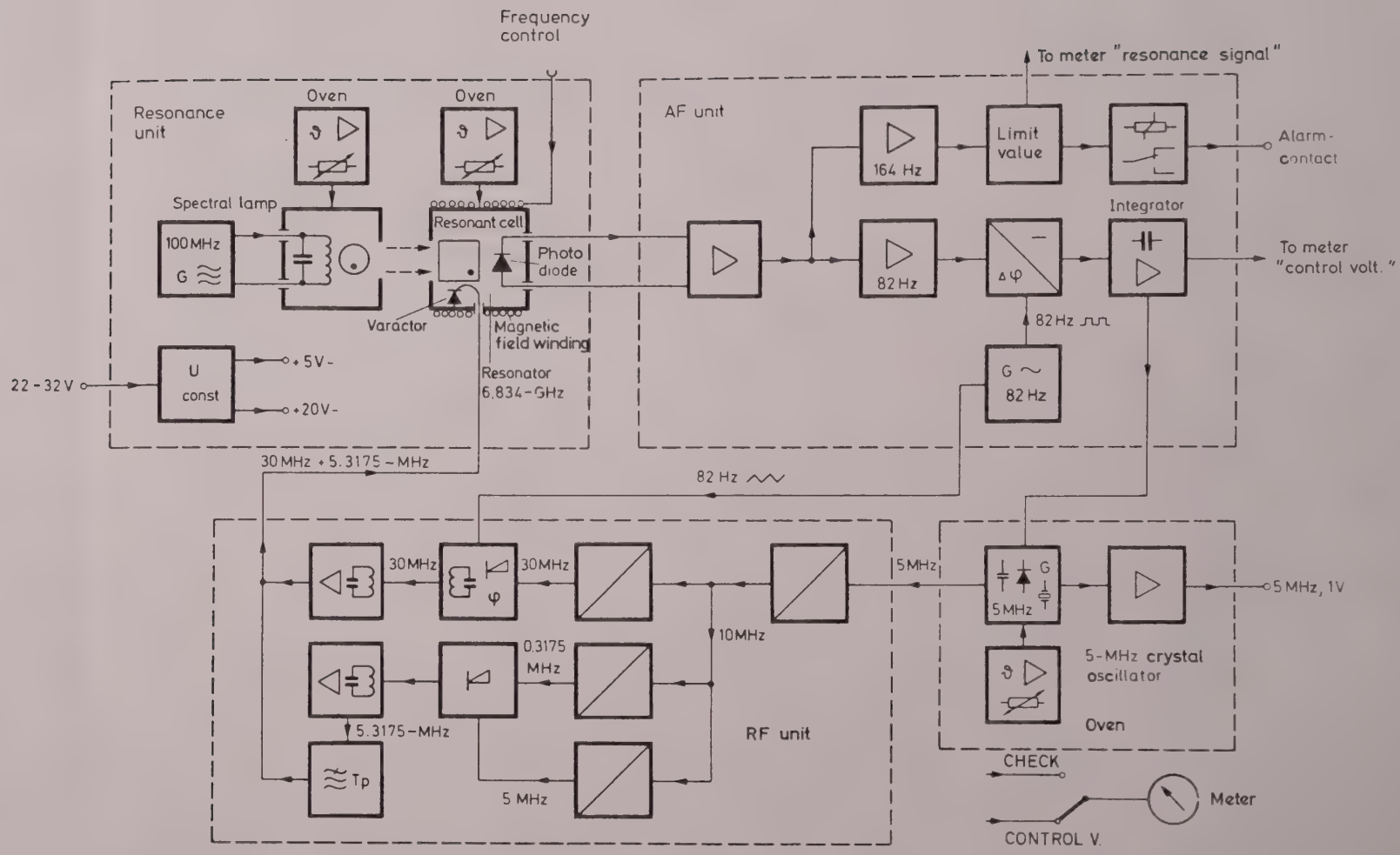


Fig. 1-1 Block diagram

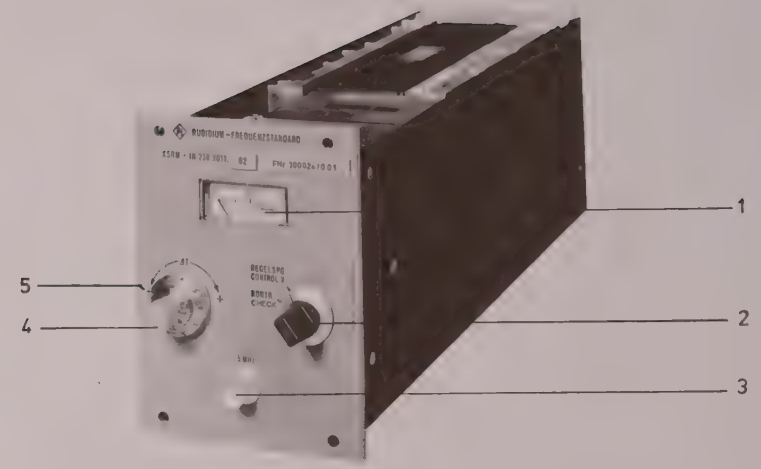


Bild 2-1 Frontansicht
Fig. 2-1 Front panel view

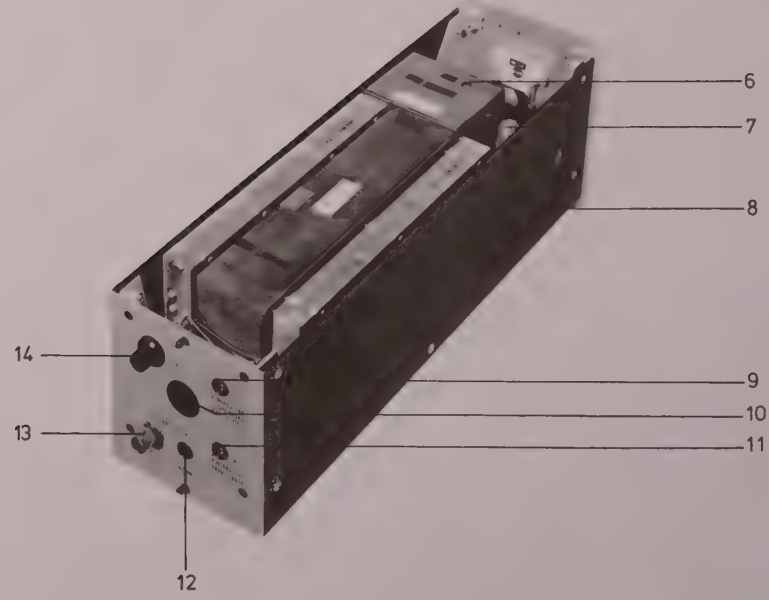


Bild 2-2 Rückansicht
Fig. 2-2 Rear view

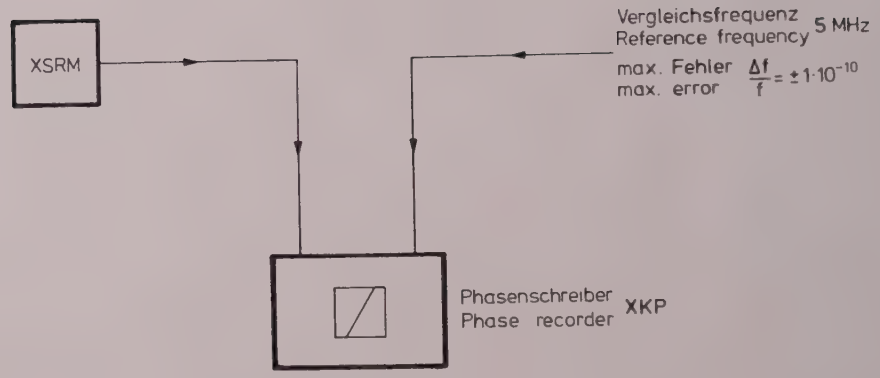


Bild 3-1 Meßaufbau zur Kontrolle der Ausgangsfrequenz
Fig. 3-1 Test setup for checking the output frequency

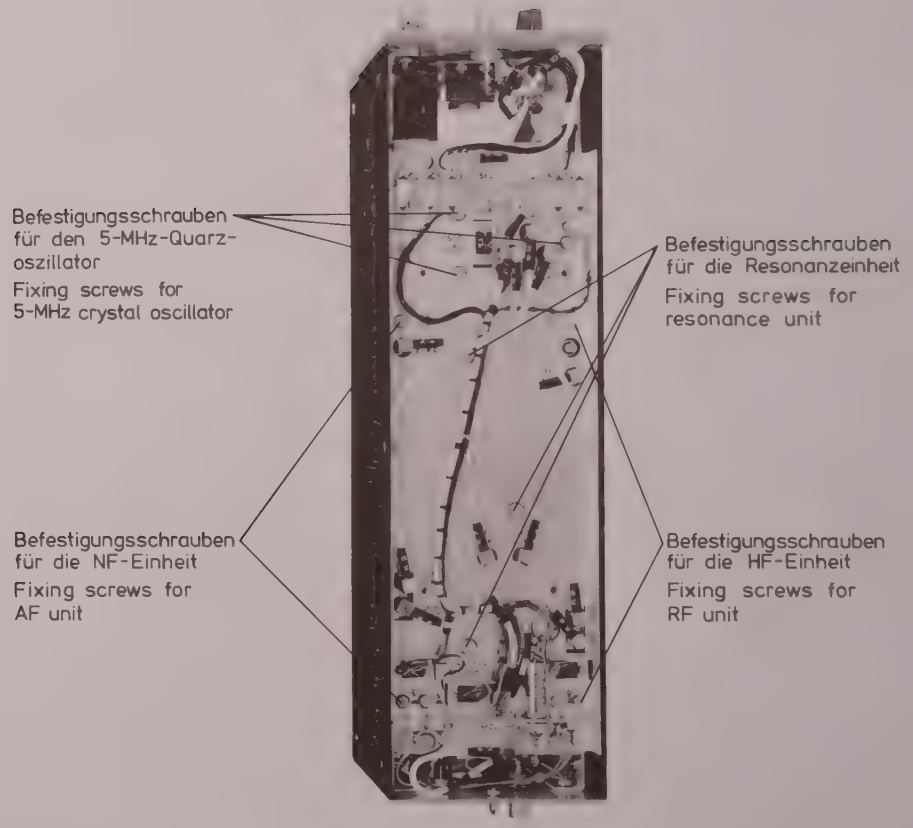


Bild 4-1 Mechanischer Aufbau des XSRM
Fig. 4-1 Mechanical layout of XSRM

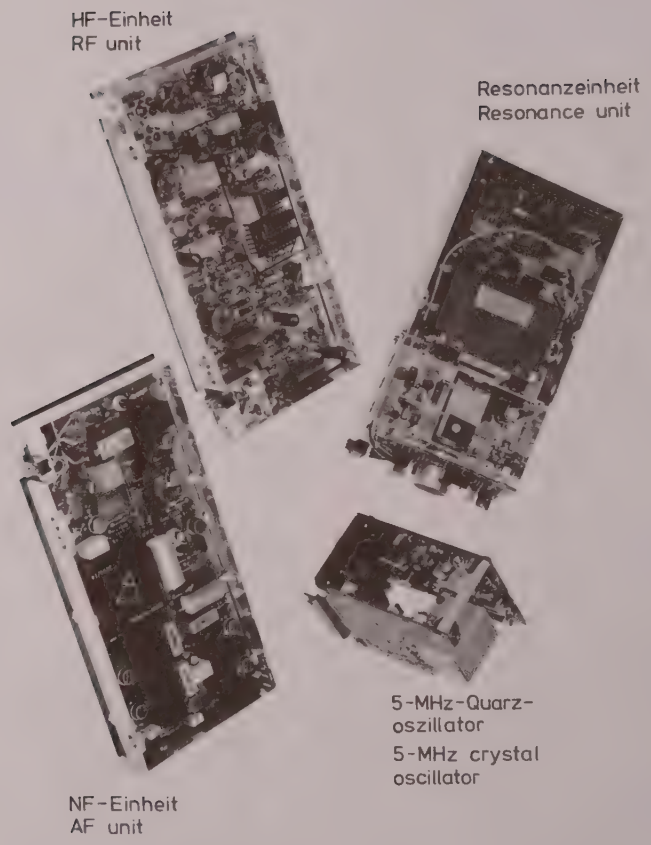


Bild 4-2 Baugruppen des XSRM
Fig. 4-2 Subassemblies of XSRM

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# Schaltteillisten
# numerisch geordnet
# Part lists
# in numerical order
# Listes des pièces détachées
# par numéros de référence

(R 29500 Bl. 3)
095.1000 Bl. 3

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# R&S-Schlüsselliste
# R&S key list
# Liste des symboles de référence R&S

Die R&S-Schaltteillisten nennen in der Spalte "Benennung/Beschreibung" die technischen Daten der Bauelemente in Kurzform. Die Art des Bauelements (z.B. Schicht-, Draht-Widerstand usw.) beschreiben die 2 Kennbuchstaben vor der "Benennung" (evtl. auch vor der "Sachnummer"), die nachfolgend erklärt werden. In Ersatzteil-Bestellungen an R&S ist stets die Angabe der vollständigen Sachnummer erforderlich.

The R&S Parts Lists give the technical data of the components in short form in the column "Benennung/Beschreibung" (designation). The type of component (e.g. depos.-carbon resistor, wire-wound resistor etc.) is indicated by 2 identification letters before the designation, possibly also before the "Sachnummer" (order number), which are explained below. When ordering spare parts from R&S, the complete order number must always be specified.

La colonne «Désignation/description» des listes de pièces de R&S indique les caractéristiques des éléments sous forme abrégée. Le type d'élément (p. ex. résistance à couche, résistance bobinée etc. ...) est décrit par les deux lettres précédant la désignation (et éventuellement le numéro de référence), dont voici l'explication. Prière d'indiquer le numéro de référence («Sachnummer») complet dans toute commande de pièces de rechange.

| Teile-familie | Art des Bauelementes | Parts family | Type of component | Famille | Type d'élément |
|---|---|---|---|---|---|
| **A** | **Aktive Bauelemente, Halbleiter** | **A** | **Active components, semiconductors** | **A** | **Composants actifs, semiconducteurs** |
| AD | Universaldiode, z.B. Gleichrichter, Sperrdiode | AD | General-purpose diode, e.g. rectifier, high-resistance diode | AD | Diode d'usage général, p.ex. redresseur, diode à haute résistance |
| AE | Spezialdiode, z.B. Tunnel-, Kapazitäts-, Zener-Diode | AE | Diode (special), e.g. tunnel diode, varactor, Zener diode | AE | Diode spéciale, p.ex. diode tunnel, varactor, diode Zener |
| AF | Fotohalbleiter, z.B. Foto-Diode, -Transistor, -Widerstand, Leuchtdiode | AF | Photo-semiconductor, e.g. resistor, diode, transistor; LED | AF | Semiconducteur photoélectrique, p.ex. diode, transistor, résistance photoél., DEL |
| AG | Leistungs-Gleichrichter, z.B. Thyristor, Triac, Selengleichrichter | AG | Power rectifier, e.g. thyristor, triac, selenium rectifier | AG | Redresseur de puissance, p.ex. thyristor, triac, redresseur, au sélénium |
| AK | Kleinsignal-Transistor | AK | Small-signal transistor | AK | Transistor faible puissance |
| AL | Leistungs-Transistor | AL | High-power transistor | AL | Transistor grande puissance |
| AM | Spezial-Transistor, z.B. FET, MOSFET | AM | Transistor (special), e.g. FET, MOS-FET | AM | Transistor spécial, p.ex. TEC, MOSTEC |
| AP | Peltier-, Hall-Element | AP | Peltier element, Hall element | AP | Element Peltier, élement Hall |
| AR | Röhre für Empfänger, Verstärker, Gleichrichter | AR | Valve for receiver, amplifier, rectifier | AR | Tube pour récepteur, amplificateur, redresseur |
| AS | Spezialröhre, z.B. Senderöhre, EW-Widerstand, Stabilisator | AS | Valve (special), e.g. for transmitter, baretter, ballast valve | AS | Tube (spécial), p.ex. pour émetteur, résistance fer-hydrogène, ballast |
| AT | Katodenstrahlröhre, z.B. Bildröhre, Ziffern-Anzeigeröhre | AT | Cathode ray tube, e.g. picture tube, digital indicator tube | AT | Tube à rayon cathodique, p.ex. tube à image, tube à affichage numérique |
| AZ | Zubehör für Halbleiter u. Röhren | AZ | Accessories for semiconductors and valves | AZ | Accessoires pour semiconducteurs et tubes |
| **B** | **Bausteine** | **B** | **PC boards, chips** | **B** | **Cartes imprimées, puces** |
| BC | Integr. Schaltkreis (Microcomp.) | BC | Integrated circuit (interface, A/D) | BC | Circuit intégré (microprocesseur) |
| BD | R&S-Dünnschicht- und Dickschichtschaltung | BD | R&S thinfilm or thickfilm circuit | BD | Circuit R&S à couche mince ou épaisse |
| BG | R&S-spezifische Gate-Arrays | BG | R&S gate arrays | BG | Circuits intégrés prédiffusés R&S |
| BJ | Integrierter Schaltkreis (Interface, A/D-Wandler) | BJ | Integrated circuit (interface, A/D converter) | BJ | Circuit intégré (interface, convertisseur A/N) |
| BL | Log. Schaltkreis z.B. DTL, TTL, HTL, ECL, C-MOS | BL | Logic circuit, e.g. DTL, TTL, HTL, ECL, C-MOS | BL | Circuit logique, p.ex. DTL, TTL, HTL, ECL, C-MOS |
| BM | Hybridbaustein, z.B. Mischer, Tuner, Modulator | BM | Hybrid chip, e.g. mixer, tuner, modulator | BM | Puce hybride, p.ex. mélangeur, tuner, modulateur |
| BO | Analogschaltkreis, z.B. Operationsverstärker | BO | Analog circuit, e.g. operational amplifier | BO | Circuit analogique. p.ex. amplificateur opérationnel |
| BP | Optoelektronischer Baustein, z.B. Anzeigeeinheit, Koppler | BP | Optoelectronic component, e.g. display, coupler | BP | Composant optoélectronique, p.ex. afficheur, coupleur |
| BS | Schalt- und Steuerbaustein, elektronischer Sensor | BS | Switching and control modul, electronic sensor | BS | Modul de commutation et de commande, sonde électronique |
| BV | Stromversorgung, Übersp.-Schutz | BV | Power pack, protective circuit | BV | Alimentation, protection surcharge |
| BZ | Zubehör | BZ | Accessories | BZ | Accessoires |

| Teile-familie | Art des Bauelementes | Parts family | Type of component | Famil-ie | Type d'élément |
|---|---|---|---|---|---|
| **C** | **Kondensatoren** | **C** | **Capacitors** | **C** | **Condensateurs** |
| CB | Bypass-, Durchf.-Kondensator | CB | Bypass capacitor, feed-through capacitor | CB | Condensateur bypass, condensateur de traversée |
| CC | Keramischer Kondensator | CC | Ceramic capacitor | CC | Condensateur céramique |
| CD | Drehkondensator | CD | Variable capacitor | CD | Condensateur variable |
| CE | Elektrolytkondensator | CE | Electrolytic capacitor | CE | Condensateur électrolytique |
| CG | Glimmerkondensator | CG | Mica capacitor | CG | Condensateur au mica |
| CH | Sperrschichtkondensator | CH | Semiconductor capacitor | CH | Condensateur semiconducteur |
| CK | Kunstfolienkondensator | CK | Synthetic-foil capacitor | CK | Condensateur à feuille synthétique |
| CL | Ker. Hochsp.-Kondensator | CL | HV capacitor (ceramic) | CL | Condensateur HT céramique |
| CM | Metallpapier-Kondensator | CM | MP capacitor | CM | Condensateur à papier métallisé |
| CN | Kondensatornetzwerk | CN | Capacitor network | CN | Réseau capacitif |
| CP | Papierkondensator | CP | Paper capacitor | CP | Condensateur au papier |
| CS | Störschutzkondensator | CS | Interference-suppression capacitor | CS | Condensateur anti-parasite |
| CT | Trimmkondensator | CT | Trimmer capacitor | CT | Condensateur ajustable |
| CV | Vakuum-Kondensator | CV | Vacuum capacitor | CV | Condensateur à vide |
| **D** | **Drähte, Leitungen** | **D** | **Wires, lines** | **D** | **Fils, lignes** |
| DD | Schalt- und Wickeldraht | DD | Hook-up or winding wire | DD | Fil de câblage, fil de bobinage |
| DF | Flachleitung, Litze | DF | Flat multiple line, stranded wire | DF | Ligne plate, ligne torsadée |
| DG | Abgeschirmte Leitung | DG | Shielded line | DG | Ligne blindé |
| DH | Koaxialkabel | DH | Coaxial line | DH | Ligne coaxiale |
| DJ | Isolierschläuche, Schrumpf-schläuche, Wellrohre, Schutzschläuche | DJ | Insulating sheaths, shrink-on sleeves, corrugated tubes, protective tubes | DJ | Gaines isolantes, gaines thermorétractables tubes ondulés, gaines protectrices |
| DL | HF-Litzen | DL | RF stranded wires | DL | Lignes torsadées RF |
| DM | Schaltlitzen (mehrdrähtige Leiter) | DM | Multi-conductor wires | DM | Lignes torsadées (multiconducteurs) |
| DN | Antenne | DN | Antenna | DN | Antenne |
| DO | Lichtleiter (optisch) | DO | Optical waveguides | DO | Guides d'onde optiques |
| DP | Leiterplatten (unbestückt) | DP | Printed circuit boards (bare) | DP | Cartes imprimées (non équipées) |
| DQ | Multilayer (unbestückt) | DQ | Multilayer boards (bare) | DQ | Cartes multicouche (non équipées) |
| DS | Anschlußkabel (mehradrig) | DS | Connecting cable, multicore | DS | Câble de connexion (multiconducteur) |
| DU | Substratplatten für Dickschicht-schaltungen | DU | Substrate boards for thickfilm circuits | DU | Cartes à substrat pour circuits à couche épaisse |
| DW | Festmantelkabel | DW | Rigid cables | DW | Câbles rigides |
| **E** | **Elektrische Teile** | **E** | **Electric parts** | **E** | **Organes électriques** |
| EB | Blei-, NC-Akku, Batterie | EB | Lead or alkaline accumulator, battery | EB | Accumulateur Pb/NC, batterie |
| ED | Gedruckte Schaltung (bestückte Leiterplatte), nicht steckbar | ED | Printed circuits (assembled), non-pluggable | ED | Circuits imprimés (équipés) non enfichables |
| EE | Gedruckte Schaltung (bestückte Leiterplatte), steckbar | EE | Printed circuits (assembled), pluggable | EE | Circuits imprimés (équipés) enfichables |
| EF | Glühlampe, Leuchte | EF | Incandescent lamp, pilot lamp | EF | Lampe à incandescence, voyant |
| EG | Glimmlampe, Entladungslampe | EG | Glow lamp, discharge lamp | EG | Lampe à luminescence lampe à décharge |
| EK | Kontakt-Streifen, -Feder | EK | Contact clip, contact spring | EK | Lampe de contact, ressort de contact |
| EL | Lautsprecher, Kopfhörer, Mikrofon | EL | Loudspeaker, headphones, microphone | EL | Haut-parleur, casque, microphone |
| EM | Motor, Hubmagnet, Drehfeldsystem | EM | Motor, lifting magnet, synchro system | EM | Moteur, électro-aimant de levage, système synchro |
| EO | Oszillator, z.B. Quarzoszillator | EO | Oscillator, e.g. crystal oscillator | EO | Oscillateur p.ex. oscillateur à quartz |
| EP | Tief-, Band-, Hochpaß, Bandsperre, Diskriminator | EP | Lowpass, bandpass, highpass filter, band-stop filter, discriminator | EP | Filtre passe-bas, passe-bande, passe-haut, suppression de bande, discriminateur |
| EQ | Schwing-, Filter-Quarz | EQ | Oscillator or filter crystal | EQ | Quartz oscillateur, quartz de filtre |
| ER | Resonator, piezoelektr./magnetostriktiv | ER | Resonator, piezoelectric/ magnetostrictive | ER | Résonateur piézo-électrique/ magneto-strictif |
| ES | Passive SHF-Bauteile | ES | Passive SHF-components | ES | Composant SHF passif |
| ET | Thermostat | ET | Thermostat | ET | Thermostat |
| EV | Lüfter, Gebläse | EV | Ventilator, blower | EV | Ventilateur, soufflerie |

**R&S-Schlüsselliste**
**R&S key list**
**Liste des symboles de référence R&S**

ROHDE&SCHWARZ

| Teile-familie | Art des Bauelementes | Parts family | Type of component | Famille | Type d'élément |
|---|---|---|---|---|---|
| **F** | **Fassungen, Steckverbindungen** | **F** | **Sockets, connectors** | **F** | **Douilles, connecteurs** |
| FG | Koax-Umrüstsatz | FG | Coaxial screw-in assembly | FG | Ensemble vissable coaxial |
| FH | Koax-Übergang auf Fremdsystem | FH | Coaxial adapter | FH | Adaptateur coaxial |
| FJ | BNC-Systemteil | FJ | BNC screw-in assembly | FJ | Ensemble vissable BNC |
| FK | Koaxial-UHF-Systemteil | FK | Coaxial UHF screw-in assembly | FK | Ensemble vissable coaxial UHF |
| FM | Mehrfachstecker, Buchsenleiste | FM | Multipoint connector | FM | Connecteur multiple |
| FN | Netz-Steckverbindung | FN | AC-supply connector | FN | Connecteur secteur |
| FO | Runde Mehrfach-Steckverbindung | FO | Round multipoint connector | FO | Connecteur multipoles rond |
| FP | Druckschalt-Steckverbindung | FP | Multipoint connector for PC boards | FP | Connecteur multipoles pour cartes imprimées |
| FR | Fassung für Lampe, Sicherung, usw. | FR | Socket for lamp, fuse, etc. | FR | Douille pour lampe, fusible etc. . . . |
| FT | Schwachstrom-Steckverbindung | FT | LV plug and socket | FT | Connecteur pour faible courant |
| FU | Hochspannungs-Steckverbindung | FU | HV plug and socket | FU | Connecteur pour haute tension |
| FV | Verbinder (z.B. AMP) | FV | Push-on connector | FV | Connecteur à enfichage |
| FZ | Zubehör für koax. Bauelemente | FZ | Accessories for coax. components | FZ | Accessoires pour composants coax. |
| **H** | **Software** | **H** | **Software** | **H** | **Logiciel** |
| HP | Software-Komponenten und Software-Module | HP | Rights to software components and software modules | HP | Droits d'utilisation de composants et modules logiciel |
| HS | Auf Informationsträger geladene Software | HS | Software data media | HS | Logiciel sur support d'information |
| **J** | **Meßinstrumente** | **J** | **Indicators** | **J** | **Indicateurs** |
| JD | Drehspul-Anzeigeinstrument | JD | Moving-coil meter | JD | Galvanomètre à cadre mobile |
| JE | Dreheisen-Anzeigeinstrument | JE | Moving-iron meter | JE | Galvanomètre à fer mobile |
| JF | Frequenzmesser | JF | Frequency meter | JF | Fréquencemètre |
| JG | Drehspulinstrument mit Gleichrichter | JG | Moving-coil meter with rectifier | JG | Galvanomètre à cadre mobile avec redresseur |
| JH | Betriebsstundenzähler | JH | Operating-hours counter | JH | Compteur d'heures de fonctionnement |
| JJ | Impulszähler | JJ | Pulse counter | JJ | Compteur d'impulsions |
| JK | Kleinst-Instrument, z.B. Abstimmanzeiger | JK | Mini-instrument, e.g. tuning indicator | JK | Petit indicateur, p.ex. indicateur d'accord |
| JM | Mechanisches Zählwerk | JM | Mechanical counter | JM | Compteur mécanique |
| JP | Projektions-Instrument (Leuchtziffer) | JP | Digital display | JP | Afficheur numérique |
| JQ | Quotientenmesser (Kreuzspulinstrum.) | JQ | Ratiometer (cross coul) | JQ | Quotientmètre (à cadres croisés) |
| JU | Uhrwerk | JU | Clockwork | JU | Mouvement d'horlogerie |
| JW | Elektrodyn. Anzeigeinstrument | JW | Electrodynamic meter | JW | Instrument électrodynamique |
| **L** | **Induktivitäten, Magnetik** | **L** | **Inductors, magnetic components** | **L** | **Composants inductifs et magnétiques** |
| LB | Blech- und Schnittbandkern mit Zubehör | LB | Laminated and C-cores with accessories | LB | Noyaux feuilletés et noyaux de type C, avec accessoires |
| LC | Keramische Spule | LC | Ceramic coil | LC | Bobine céramique |
| LD | Netz-, HF-Drossel, Df-Filter | LD | Choke, lead-through filter | LD | Self de choc, filtre de traversée |
| LE | Einzelkreis, Bandfilter | LE | Single tuned circuit, bandpass filter | LE | Circuit accordé, filtre passe-bande |
| LF | Ferritkern mit Zubehör | LF | Ferrite cores with accessories | LF | Noyaux en ferrite avec accessoires |
| LK | Karbonyleisenkern und elektrischer Kupferkern mit Zubehör | LK | Iron carbonyl slugs and copper slugs with accessories | LK | Noyaux en fer carbonyle et en cuivre, avec accessoires |
| LL | Luftspule | LL | Air-core coils | LL | Bobines à air |
| LM | Magnetband und -platte | LM | Magnetic tapes and disks | LM | Bandes et disques magnétiques |
| LS | Schirmbecher | LS | Screening cans | LS | Boîtiers de blindage |
| LT | Netztransformator | LT | Power transformer | LT | Transformateur secteur |
| LU | NF-Übertrager | LU | AF transformer | LU | Transformateur BF |
| LV | Variometer | LV | Variometer | LV | Variomètre |
| LW | Wickelkörper, allgemein | LW | Coil formers, general | LW | Carcasses de bobine, en général |

| Teile-familie | Art des Bauelementes | Parts family | Type of component | Famil-le | Type d'élément |
|---|---|---|---|---|---|
| **R** | **Widerstände** | **R** | **Resistors** | **R** | **Résistances** |
| RD | Drahtwiderstand | RD | Wire-wound resistor | RD | Résistance bobinée |
| RF | Kohleschicht-Widerstand | RF | Carbon-film resistor | RF | Résistance à couche de carbone |
| RG | Metallglasur-Widerstand | RG | Metal-coated resistor | RG | Résistance à couche métallique |
| RJ | Metalloxyd-Widerstand | RJ | Metal-oxide resistor | RJ | Résistance à oxyde métallique |
| RK | Kaltleiter, Heißleiter, Varistor | RK | PTC, NTC resistors, varistors | RK | Résistances CPT, CNT, varistors |
| RL | Metallfilm-Widerstand | RL | Metal-film resistor | RL | Résistance à film métallique |
| RN | Widerstandsnetzwerk | RN | Resistor network | RN | Réseau de résistance |
| RR | Draht-Potentiometer | RR | Wire-wound potentiometer | RR | Potentiomètre bobiné |
| RS | Schicht-Potentiometer | RS | Carbon-film potentiometer | RS | Potentiomètre à couche |
| RT | Dämpfungsglied, Abschlußwiderstand | RT | Attenuator, termination | RT | Atténuateur, charge |
| RV | Drahtwiderstand mit Abgriff | RV | Wire-wound resistor, tapped | RV | Résistance bobinée à prise |
| RW | Wendelpotentiometer | RW | Helical potentiometer | RW | Potentiomètre hélicoidal |
| **S** | **Schalter, Relais, Sicherungen** | **S** | **Switches, relays, fuses** | **S** | **Commutateurs, relais, fusibles** |
| SB | Drucktastenschalter | SB | Pushbutton switch | SB | Commutateur à touche |
| SD | Drehschalter | SD | Rotary switch | SD | Commutateur rotatif |
| SF | Kontaktfedersatz | SF | Spring contact assembly | SF | Jeu de ressorts de contact |
| SH | HF-Koaxialschalter, -Relais, -Teiler | SH | Coaxial RF switch, RF relay, RF attenuator | SH | Commutateur RF coaxial, relais RF, atténuateur RF |
| SK | Kipp-, Wipp- und Schiebeschalter | SK | Toggle switch, slide switch | SK | Commutateur à bascule, à glissière |
| SL | Leistungsschalter Netz/HF | SL | AC supply switch, high-power RF switch | SL | Commutateur secteur, de puissance RF |
| SM | Mikroschalter | SM | Microswitch | SM | Microrupteur |
| SN | Elektromagnet, Relais | SN | Electromagnetic relay | SN | Relais électromagnétique |
| SP | Leistungsrelais, Luftschütz | SP | Power relay, air-type contactor | SP | Relais de puissance, contacteur à air |
| SR | Reedrelais | SR | Reed relay | SR | Relais reed |
| SS | Sicherung, Schutzschalter | SS | Fuse, automatic cut-out | SS | Fusible, coupe-circuit automatique |
| ST | Thermoschalter | ST | Thermal circuit breaker | ST | Disjoncteur thermique |
| SU | Überspannungs-Ableiter | SU | Arrester | SU | Eclateur |
| SW | Wechselrichter, Näherungsschalter | SW | Inverter (DC-AC), proximity switch | SW | Inverseur (DC-AC), commutateur de proximité |
| SZ | Zeitschalter | SZ | Time switch | SZ | Interrupteur horaire |
| **V** | **Verbindungselemente** | **V** | **Connecting elements** | **V** | **Eléments de raccordement** |
| VK | Klemme, Klemmleiste | VK | Clamp, terminal strip | VK | Pince, réglette à bornes |
| VL | Lötöse, Stützpunkt | VL | Soldering lug | VL | Cosse à souder |
| VS | Schraube, Mutter, Scheibe | VS | Screw, nut, washer | VS | Vis, écrou, disque |

**Farbcode für Widerstände und Kondensatoren**

**Anmerkung:**
Die Wertangabe der weitgehend miniaturisierten Bauelemente erfolgt überwiegend durch Farbkennzeichnungen, deren Bedeutung der nachfolgenden Tabelle entnommen werden kann.

**Hinweis:**
Im Zuge des technischen Fortschrittes setzt R&S zunehmend Metallschichtwiderstände mit 1% Toleranz anstelle von Kohleschichtwiderständen mit 5% Toleranz ein. Metallschichtwiderstände können sich dabei an Stellen befinden, an denen gemäß Schaltteilliste Kohleschichtwiderstände vorgesehen sind. Etwaige geringfügige Differenzen der Nennwerte zwischen Stromlaufplan, Schaltteilliste und Gerät liegen im zulässigen Toleranzbereich.

**Colour code for resistors and capacitors**

**Note:**
The electrical values of the largely miniaturized components are mainly identified by a colour code, the meaning of which can be taken from the table below.

**N. B.:**
Following the state of the art R&S makes increasing use of metal-film resistors (1% tolerance) instead of carbon-film resistors (5% tolerance). Metal-film resistors may have been employed where carbon-film resistors are specified in the parts list. Any slight differences of nominal values between circuit diagram, parts list and equipment are within tolerance.

**Code couleur pour résistances et condensateurs**

**Remarque:**
Les valeurs électriques des composants fort miniaturisés sont indiquées dans la plupart des cas par un code couleur dont voici l'explication.

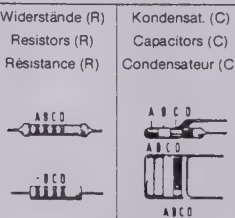
**N. B.:**
Suivant le progres technique R&S utilise de plus en plus des résistances à film métallique (tolérance 1%) au lieu des résistances à couche de carbone (tolérance 5%). Des résistances à film metallique peuvent se trouver en des points où des types à couche de carbone figurent dans la liste des composants. Les différences minimes des valeurs nominales existant eventuellement entre le schéma de circuit, la liste des composants et l'appareil sont dans la marge de tolérance.

| Farbe/Colour/Couleur | A | B | C | D |
|---|---|---|---|---|
| Schwarz/Black/Noir | — | 0 | | |
| Braun/Brown/Marron | 1 | 1 | 0 | ± 1% |
| Rot/Red/Rouge | 2 | 2 | 00 | ± 2% |
| Orange/Orangé | 3 | 3 | 000 | |
| Gelb/Yellow/Jaune | 4 | 4 | 0000 | |
| Grün/Green/Vert | 5 | 5 | 00000 | ± 0,5% |
| Blau/Blue/Bleu | 6 | 6 | 000000 | |
| Violett/Violet | 7 | 7 | — | ± 0,1% |
| Grau/Gray/Gris | 8 | 8 | — | |
| Weiß/White/Blanc | 9 | 9 | — | |
| Gold/Doré | — | — | — | ± 5% |
| Silber/Silver/Argenté | — | — | — | ± 10% |
| Ohne Farbe/No colour/ Pas de couleur | — | — | — | ± 20% |

1) Toleranzring, hier nicht spezifiziert.

Anordnungsbeispiele für Examples for / Exemple pour

| Widerstände (R) | Kondensat. (C) |
|---|---|
| Resistors (R) | Capacitors (C) |
| Résistance (R) | Condensateur (C) |




**Definition* / Définition ***

Kennzeichen A (Bauteilfarbe/1. Farbring) = 1. Zahl
Kennzeichen B (Bauteilende/2. Farbring) = 2. Zahl
Kennzeichen C (Punkt/3. Farbring) - 3. Zahl = Zahl der Nullen
Kennzeichen D (Punkt/4. Farbring) = Toleranz des Nennwerts in %
(Fehlendes Kennzeichen für D bedeutet ±20%)
Das Fehlen eines Kennzeichens bedeutet, daß die Farbe des Bauteilkorpers die Wertangabe darstellt.

Marking A (body colour or first coloured ring) = 1st digit
Marking B (body end or second coloured ring) = 2nd digit
Marking C (dot or third coloured ring) = number of zeroes
Marking D (dot or fourth coloured ring) = tolerance on nominal value in %
(with no D marking tolerance ± 20%)
The absence of a marking signifies that the body colour gives the corresponding information.

Repérage A (couleur du corps ou 1er anneau) = 1er chiffre
Repérage B (bout du corps ou 2e anneau) = 2e chiffre
Repérage C (point ou 3e anneau) = nombre de zéros.
Repérage D (point ou 4e anneau) = tolérance en % de la valeur nominale
(L'absence du repérage D signifie ± 20%)
L'absence de tout reperage signifie que la couleur du corps du composant représente la valeur correspondante.

1) Tolerance ring, here not specified.
1) Anneau de tolérance, ne pas spécifié ici.

* Siehe auch DIN 41 429 und DIN 40 825
* see also IEC publication 62-1952 and 62-1968
* Voir aussi DIN 41 429 et DIN 40 825

| Kennzeichen Component No. | Benennung/Beschreibung Designation | Sachnummer Stock No. | enthalten in contained in |
|---|---|---|---|
| A | ZUGEHOERIGER STROMLAUF 238.4011 S | | |
| BU1 | FM BUCHSENLEISTE 10POL. 10-SOCKET INSERT AMPHENOL T2610001 | 018.4866 | 238.7810 |
| BU2 | FM BUCHSENLEISTE 10POL. 10-SOCKET INSERT AMPHENOL T2610001 | 018.4866 | 238.7810 |
| BU3 | FM BUCHSENLEISTE 10POL. 10-SOCKET INSERT AMPHENOL T2610001 | 018.4866 | 238.7810 |
| BU4 | FM BUCHSENLEISTE 10POL. 10-SOCKET INSERT AMPHENOL T2610001 | 018.4866 | 238.7810 |
| BU20 | FJ EINBAUBUCHSE SYST.BNC FIXED BNC SOCKET,50 OHM ROSENBERG 51K-503-200-A2 | FJ 017.6607 | |
| BU22 | FO EINBAUBUCHSE 3 POLIG FIXED SOCKET 3-POLES LEMOSA RA0303 | 070.4157 | |
| BU23 | FO EINBAUBUCHSE 2 POLIG 2-POLE FIXED SOCKET LEMOSA RA0302 | 070.4140 | |
| BU25 | FJ EINBAUBUCHSE SYST.BNC FIXED BNC SOCKET,50 OHM ROSENBERG 51K-503-200-A2 | FJ 017.6607 | |
| BU26 | FO EINBAUBUCHSE 2 POLIG 2-POLE FIXED SOCKET LEMOSA RA0302 | 070.4140 | |
| C1 | CB 5NF+80%-20% HDK FEED-THROUGH CAPACITOR ERIE 2499-003-X5WO-502Z | CB 067.0648 | 238.4270.01 |
| BIS/TO C8 | | | |
| C9 | CP 10NF-20+30%300V DB DF FEED-THROUGH CAPACITOR | 024.9037 | 238.4270.01 |
| C10 | CB 5NF+80%-20% HDK FEED-THROUGH CAPACITOR ERIE 2499-003-X5WO-502Z | CB 067.0648 | 238.4270.01 |
| C11 | CB 5NF+80%-20% HDK FEED-THROUGH CAPACITOR ERIE 2499-003-X5WO-502Z | CB 067.0648 | 238.4270.01 |
| C12 | CC 22PF+-2%4X5NPO CAPACITOR VALVO 2222 678 10229 | CC 087.6464 | |
| C13 | CC 47PF+-2%3X4N750 CAPACITOR VALVO 2222 678 58479 | CC 087.6864 | |
| C14 | CE 22 UF -10+50% 70V10X26 ELECTROLYTIC CAPACITOR SIEMENS ELKOB41588-A8226-T | CE 006.6146 | |
| C15 | CC 22PF+-2%4X5NPO CAPACITOR VALVO 2222 678 10229 | CC 087.6464 | |



Für diese Unterlage behalten wir uns alle Rechte vor

| Kennzeichen Component No. | Benennung/Beschreibung Designation | Sachnummer Stock No. | enthalten in contained in |
|---|---|---|---|
| C16 | CC 27PF+-2%4X5NPO<br>CAPACITOR<br>VALVO 2222 678 10279 | CC 087.6470 | |
| GL1 | AG BYX30/200R GL 200V14A0<br>RECTIFIER<br>VALVO BYX30/200R | 013.0862 | |
| J1 | JK 100UA 40X45 U<br>METER<br>GOSSEN PEC 00-U | 238.4228 | |
| K2 | DX HF-KABEL | 238.7856 | 238.4270.01 |
| K3 | DX HF-KABEL | 238.7862 | 238.4270.01 |
| K4 | DX HF-KABEL<br>CABLE | 238.7879 | 238.4270.01 |
| K5 | DX HF-KABEL<br>RF CABLE | 238.7885 | 238.4270.01 |
| K6 | DX HF-KABEL | 238.7891 | 238.4270.01 |
| K7 | DX HF-KABEL<br>RF CABLE | 238.7904 | 238.4270.01 |
| K8 | DX HF-KABEL | 238.8030 | |
| K9 | DX HF-KABEL | 238.8046 | |
| K10 | DX HF-KABEL | 238.8052 | |
| K11 | DX HF-KABEL | 238.7910 | 238.7810 |
| K12 | DX KABEL | 238.7927 | 238.7810 |
| K13 | DX KABEL | 238.8069 | |
| K14 | DX KABEL | 238.8146 | 238.8075 |
| L1 | LD 0,47UH10%0,35OHM0,660A<br>CHOKE<br>DELEVAN DROSSEL1025-12 | LD 067.2828 | |
| L2 | LD 0,22UH10%0,14OHM1,045A<br>CHOKE<br>DELEVAN DROSSEL1025-04 | LD 067.2786 | |
| R1 | RW 1,5W10KOHM+-3%LINO,25%<br>HELICAL POTENTIOMETER<br>BECKMAN 7216R,10K,L25 | 030.3714 | |
| R2 | RF 0,3W 47OHM +-5%<br>RESISTOR<br>BEYSCHLAG SBC0309/47OHM5% | 028.2150 | 238.4270.01 |
| S1 | SD 1EBENE 6MAL 2 UNTERBR<br>ROTARY SWITCH<br>SEL SB161 6E25A02U<br>ACHS-L=19 | SD 021.6689 | |
| SI1 | SS SCHMELZS.T2,5DDIN41571<br>FUSE<br>WICKMANN T2,5D DIN 41571 TROP | SS 020.7575 | |
| ST21 | FJ EINBAUSTECKER SYST.SMB<br>FIXED CONNECTOR<br>ROSENBERG 59S601-200D2 | FJ 063.5116 | 238.4270.01 |
| ST24 | FJ EINBAUSTECKER SYST.SMB<br>FIXED CONNECTOR<br>ROSENBERG 59S601-200D2 | FJ 063.5116 | 238.4270.01 |



095.0026-1186

| Kennzeichen Component No. | Benennung/Beschreibung Designation | Sachnummer Stock No. | enthalten in contained in |
|---|---|---|---|
| Y1 | ZE NF-EINHEIT<br>A-F UNIT<br>HIERZU STROML.238.4411 S | 238.4411 | 238.4270.01 |
| Y2 | ZE HF-EINHEIT<br>RF UNIT<br>HIERZU STROML.238.5001 S | 238.5001 | 238.4270.01 |
| Y3 | ZE RESONANZ-EINHEIT<br>NUR VAR : 02<br>RESONANCE CIRCUIT UNIT<br>HIERZU STROML.238.5501 S | 238.5501 | 238.4270.01 |
| Y3 | ZE RESONANZ-EINHEIT<br>NUR VAR : 03<br>HIERZU STROML.238.7179 S | 238.7179 | 238.4270.01 |
| Y4 | ZE 5MHZ-QUARZ-OSZILLATOR<br>NUR VAR : 02<br>CRYSTAL OSCILLATOR<br>HIERZU STROML.238.7285 S | 238.7285 | 238.4270.01 |
| Y4 | ZE 5 MHZ-QUARZ-OSZILLATOR<br>NUR VAR : 03<br>5MHZ CRYSTAL OSCILLATOR<br>HIERZU STROML.216.1110 S | 216.1110 | 238.4270.01 |
| | | | - ENDE - |

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| Kennz. Comp.No. | Benennung Designation | Sachnummer Stock No. | Hersteller Manufacturer | Bezeichnung Designation | enthalten in contained in |
|---|---|---|---|---|---|
| B1 ..6 | BO UA741 OPAMP OPERATIONAL AMPLIFIER | 009.1251 | NSC | UA741AHM | 238.4563 |
| B7 | BO UA748 L.POW OPAMP OPERATIONAL AMPLIFIER | 238.4628 | FAIRCHILD | UA748HM | 238.4563 |
| B9 | BO UA741 OPAMP OPERATIONAL AMPLIFIER | 009.1251 | NSC | UA741AHM | 238.4563 |
| C1 | CC 100NF+-10%100V K1200VI CERAMIC CAPACITOR | 060.1149 | UNION CARB | CKO6BX104K | 238.4563 |
| C2 | CE 4,7UF+-20%20V 7X 4X 8 ELECTROLYTIC CAPACITOR | CE 022.8110 | ROEDERSTEI | ETR 2 4,7/20 20% | 238.4563 |
| C3 | CK 470NF+-20%100VQUADER PLASTIC-FOIL CAPACITOR | CK 006.5079 | ROEDERST | MKT1822-447/O | 238.4563 |
| C4 | CC 22 NF+- 5%100V NPO VIE CAPACITOR | 060.1055 | SANFERNAN | B108BY223JD | 238.4563 |
| C5 | CC 22 NF+- 5%100V NPO VIE CAPACITOR | 060.1055 | SANFERNAN | B108BY223JD | 238.4563 |
| C6 | CC 22 NF+- 5%100V NPO VIE CAPACITOR | 060.1055 | SANFERNAN | B108BY223JD | 238.4563 |
| C7 | CC 22 NF+- 5%100V NPO VIE CAPACITOR | 060.1055 | SANFERNAN | B108BY223JD | 238.4563 |
| C8 | CC 22 NF+- 5%100V NPO VIE CAPACITOR | 060.1055 | SANFERNAN | B108BY223JD | 238.4563 |
| C9 | CC 22 NF+- 5%100V NPO VIE CAPACITOR | 060.1055 | SANFERNAN | B108BY223JD | 238.4563 |
| C10 | CC 22 NF+- 5%100V NPO VIE CAPACITOR | 060.1055 | SANFERNAN | B108BY223JD | 238.4563 |
| C12 | CC 12 NF+- 5%100V NPO VIE CAPACITOR | 060.1026 | ERIE | 8157-100-COG-12NG-J | 238.4563 |
| C13 | CC 22 NF+- 5%100V NPO VIE CAPACITOR | 060.1055 | SANFERNAN | B108BY223JD | 238.4563 |
| C14 | CE 22 UF+-20%35V12X 7X11 ELECTROLYTIC CAPACITOR | CE 022.8227 | ROEDERSTEI | ETR 4 22/40 20% | 238.4563 |
| C15 | CC 12 NF+- 5%100V NPO VIE CAPACITOR | 060.1026 | ERIE | 8157-100-COG-12NG-J | 238.4563 |
| C16 | CK 470NF+-20%100VQUADER PLASTIC-FOIL CAPACITOR | CK 006.5079 | ROEDERST | MKT1822-447/O | 238.4563 |
| C17 | CK 2,2UF+-20% 63V 11RDX24 CAPACITOR | 024.6673 | WESTERMANN | MKB3-2,2/63VISOL | 238.4563 |
| C18 | CC 22 NF+- 5%100V NPO VIE CAPACITOR | 060.1055 | SANFERNAN | B108BY223JD | 238.4563 |
| C19 | CC 22 NF+- 5%100V NPO VIE CAPACITOR | 060.1055 | SANFERNAN | B108BY223JD | 238.4563 |
| C20 | CC 22 NF+- 5%100V NPO VIE CAPACITOR | 060.1055 | SANFERNAN | B108BY223JD | 238.4563 |
| C21 | CC 22 NF+- 5%100V NPO VIE CAPACITOR | 060.1055 | SANFERNAN | B108BY223JD | 238.4563 |
| C22 | CC 100NF+-10%100V K1200VI CERAMIC CAPACITOR | 060.1149 | UNION CARB | CKO6BX104K | 238.4563 |
| C23 | CK 470NF+-20%100VQUADER PLASTIC-FOIL CAPACITOR | CK 006.5079 | ROEDERST | MKT1822-447/O | 238.4563 |
| C24 | CK 4,7UF+-20% 63V 12RDX28 CAPACITOR | 024.6696 | WESTERMANN | MKB3-4,7/63VISOL | 238.4563 |
| C25 | CE 10 UF+-20%35V12X 7X11 ELECTROLYTIC CAPACITOR | CE 022.8210 | ROEDERSTEI | ETR 4 10/40 20% | 238.4563 |
| C26 | CE 47 UF+-20%35V12X12X11 ELECTROLYTIC CAPACITOR | CE 022.8233 | ROEDERSTEI | ETR 5 47/40 20% | 238.4563 |
| C27 | CE 4,7UF+-20%20V 7X 4X 8 ELECTROLYTIC CAPACITOR | CE 022.8110 | ROEDERSTEI | ETR 2 4,7/20 20% | 238.4563 |
| GL2 | AD 1N4151 50V 0A2 UDI DIODE | AD 012.0723 | AEG-TELEF. | 1N4151 | 238.4563 |
| GL3 | AD 1N4151 50V 0A2 UDI DIODE | AD 012.0723 | AEG-TELEF. | 1N4151 | 238.4563 |
| GL4 | AE BZX79/C4V7 0,5W ZDI ZENER DIODE | AE 012.2432 | AEG | BZX55/C4V7 GEG. | 238.4563 |
| GL5 | AE BZX79/C12 0,5W ZDI ZENER DIODE | AE 012.2532 | VALVO | BZX55/C12 BZX79... | 238.4563 |
| GL6 | AE BZX79/C12 0,5W ZDI ZENER DIODE | AE 012.2532 | VALVO | BZX55/C12 BZX79... | 238.4563 |
| GL7 | AE 1N938 9,0V REFDI REFERENCE DIODE | AE 012.4806 | THOMSON | 1N938 | 238.4563 |
| GL8 | AD 1N4151 50V 0A2 UDI DIODE | AD 012.0723 | AEG-TELEF. | 1N4151 | 238.4563 |
| GL9 | AD 1N4151 50V 0A2 UDI DIODE | AD 012.0723 | AEG-TELEF. | 1N4151 | 238.4563 |
| GL11 | AD 1N4151 50V 0A2 UDI DIODE | AD 012.0723 | AEG-TELEF. | 1N4151 | 238.4563 |

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| Kennz. Comp.No. | Benennung Designation | Sachnummer Stock No. | Hersteller Manufacturer | Bezeichnung Designation | enthalten in contained in |
|---|---|---|---|---|---|
| L1 | LD 150UH 10% 0,23A 4R1 CHOKE | 026.3388 | JAHRE | 74.11-1500K | 238.4563 |
| L2 | LD 15UH 10% 0,57A 1R32 CHOKE | 026.3265 | JAHRE | 74.11-15R0K | 238.4563 |
| R1 | RF 0,3 W 6,8 KOHM +-5% RESISTOR | 028.2614 | BEYSCHLAG | SBC0309/6,8K5% | 238.4563 |
| R2 | RF 0,3W10 KOHM+-5% DEPOS.-CARBON RESISTOR | 028.2643 | BEYSCHLAG | SBC0309/10K5% | 238.4563 |
| R3 | RF 0,3W 1000HM +-5% DEPOS.-CARBON RESISTOR | 028.2220 | BEYSCHLAG | SBC0309/1000HM5% | 238.4563 |
| R4 | RF 0,3 W 150 KOHM +-5% RESISTOR TRIMMWERT" | 028.2889 | BEYSCHLAG | SBC0309/150K5% | 238.4563 |
| R5 | RF 0,3 W 100 KOHM +-5% DEPOS.-CARBON RESISTOR TRIMMWERT" | 028.2850 | BEYSCHLAG | SBC0309/100K5% | 238.4563 |
| R6 | RL 0,5W 1,0 MOHM+-1%TK50 RESISTOR | 067.6746 | SFERNICE | RCMS1 1 MOHM 1%K3 | 238.4563 |
| R7 | RL 0,1W 2,67KOHM+-1%TK50 RESISTOR | 067.4637 | DALE | MF1/10 2,67K 1%TK50 | 238.4563 |
| R8 | RR 0,6W 2KOHM+-5%STEH. POTENTIOMETER | 238.4592 | VITROHM | 800-208 2K | 238.4563 |
| R9 | RF 0,3 W 100 KOHM +-5% DEPOS.-CARBON RESISTOR | 028.2850 | BEYSCHLAG | SBC0309/100K5% | 238.4563 |
| R10 | RL 0,5W 1,0 MOHM+-1%TK50 RESISTOR | 067.6746 | SFERNICE | RCMS1 1 MOHM 1%K3 | 238.4563 |
| R11 | RL 0,1W 2,67KOHM+-1%TK50 RESISTOR | 067.4637 | DALE | MF1/10 2,67K 1%TK50 | 238.4563 |
| R12 | RR 0,6W 2KOHM+-5%STEH. POTENTIOMETER | 238.4592 | VITROHM | 800-208 2K | 238.4563 |
| R13 | RL 0,5W 1,0 MOHM+-1%TK50 RESISTOR | 067.6746 | SFERNICE | RCMS1 1 MOHM 1%K3 | 238.4563 |
| R14 | RL 0,1W 2,67KOHM+-1%TK50 RESISTOR | 067.4637 | DALE | MF1/10 2,67K 1%TK50 | 238.4563 |
| R15 | RR 0,6W 2KOHM+-5%STEH. POTENTIOMETER | 238.4592 | VITROHM | 800-208 2K | 238.4563 |
| R16 | RL 0,5W 1,0 MOHM+-1%TK50 RESISTOR | 067.6746 | SFERNICE | RCMS1 1 MOHM 1%K3 | 238.4563 |
| R17 | RL 0,1W 2,67KOHM+-1%TK50 RESISTOR | 067.4637 | DALE | MF1/10 2,67K 1%TK50 | 238.4563 |
| R18 | RR 0,6W 2KOHM+-5%STEH. POTENTIOMETER | 238.4592 | VITROHM | 800-208 2K | 238.4563 |
| R19 | RF 0,5 W 10 MOHM +-5% DEPOS.-CARBON RESISTOR | 007.1854 | RESISTA | SK4/10M5% | 238.4563 |
| R20 | RF 0,3 W 100 KOHM +-5% DEPOS.-CARBON RESISTOR | 028.2850 | BEYSCHLAG | SBC0309/100K5% | 238.4563 |
| R21 | RF 0,3W10 KOHM+-5% DEPOS.-CARBON RESISTOR | 028.2643 | BEYSCHLAG | SBC0309/10K5% | 238.4563 |
| R22 | RF 0,3 W 390 OHM +-5% RESISTOR | 028.2343 | BEYSCHLAG | SBC0309/390OHM5% | 238.4563 |
| R23 | RL 0,35W 56,2KOHM+-1%TK50 RESISTOR TRIMMWERT" | RL 082.2231 | DRALORIC | SMA0207/56,2K-F-C | 238.4563 |
| R24 | RL 0,1W 10,0KOHM+-1%TK50 RESISTOR | 067.4772 | DALE | MF1/10 10,0K 1%TK50 | 238.4563 |
| R25 | RR 0,6W 500 OHM+-5%STEH. POTENTIOMETER | 238.4605 | VITROHM | 800-208 500R | 238.4563 |
| R26 | RL 0,1W 10,0KOHM+-1%TK50 RESISTOR | 067.4772 | DALE | MF1/10 10,0K 1%TK50 | 238.4563 |
| R27 | RL 0,1W 10,0KOHM+-1%TK50 RESISTOR | 067.4772 | DALE | MF1/10 10,0K 1%TK50 | 238.4563 |
| R28 | RL 0,1W 10,0KOHM+-1%TK50 RESISTOR | 067.4772 | DALE | MF1/10 10,0K 1%TK50 | 238.4563 |
| R29 | RL 0,1W 22,1KOHM+-1%TK50 RESISTOR | 067.4850 | DALE | MF 1/10 22,1K 1%TK50 | 238.4563 |
| R30 | RL 0,1W 10,0KOHM+-1%TK50 RESISTOR | 067.4772 | DALE | MF1/10 10,0K 1%TK50 | 238.4563 |
| R31 | RL 0,1W 68,1KOHM+-1%TK50 RESISTOR TRIMMWERT" | 067.4972 | DALE | MF1/10 68,1K 1%TK50 | 238.4563 |
| R32 | RR 0,6W 20KOHM+-5%STEH. POTENTIOMETER | 238.4611 | VITROHM | 800-208 20K | 238.4563 |
| R33 | RF 0,3 W 2,2 KOHM +-5% DEPOS.-CARBON RESISTOR | 028.2508 | BEYSCHLAG | SBC0309/2,2K5% | 238.4563 |
| R34 | RF 0,3 W 3,3 KOHM +-5% RESISTOR | 028.2543 | BEYSCHLAG | SBC0309/3,3K5% | 238.4563 |

| Kennz. Comp.No. | Benennung Designation | | Sachnummer Stock No. | Hersteller Manufacturer | Bezeichnung Designation | enthalten in contained in |
|---|---|---|---|---|---|---|
| R35 | RF 0,3 W 3,3 KOHM +-5% RESISTOR | | 028.2543 | BEYSCHLAG | SBC0309/3,3K5% | 238.4563 |
| R36 | RF 0,3 W 2,2 KOHM +-5% DEPOS.-CARBON RESISTOR | | 028.2508 | BEYSCHLAG | SBC0309/2,2K5% | 238.4563 |
| R37 | RF 0,3 W 4,7 KOHM +-5% DEPOS.-CARBON RESISTOR | | 028.2572 | BEYSCHLAG | SBC0309/4,7K5% | 238.4563 |
| R38 | RF 0,3 W 22 KOHM +-5% DEPOS.-CARBON RESISTOR | | 028.2714 | BEYSCHLAG | SBC0309/22K5% | 238.4563 |
| R39 | RF 0,3 W 330 KOHM +-5% DEPOS.-CARBON RESISTOR TRIMMWERT" | | 028.2966 | BEYSCHLAG | SBC0309/330K5% | 238.4563 |
| R40 | RF 0,3W10 KOHM+-5% DEPOS.-CARBON RESISTOR TRIMMWERT" | | 028.2643 | BEYSCHLAG | SBC0309/10K5% | 238.4563 |
| R41 | RL 0,65W 1,0 MOHM+-1%TK50 METAL FILM RESISTOR TRIMMWERT WIDERST.0,5W | | 006.2863 | RESISTA | MK4 1 MOHM 1% TK50 | 238.4563 |
| R43 | RL 0,35W 23,7KOHM+-1%TK50 RESISTOR | RL | 083.1568 | DRALORIC | SMA/207/23,7K-F-C | 238.4563 |
| R44 | RF 0,3 W 180 KOHM +-5% RESISTOR TRIMMWERT" | | 028.2908 | BEYSCHLAG | SBC0309/180K5% | 238.4563 |
| R46 | RL 0,35W 150 KOHM+-1%TK50 RESISTOR TRIMMWERT | RL | 083.2129 | DRALORIC | SMA/207/150K-F-C | 238.4563 |
| R47 | RL 0,35W 26,7KOHM+-1%TK50 RESISTOR | RL | 083.1597 | DRALORIC | SMA/207/26,7K-F-C | 238.4563 |
| R48 | RL 0,35W 24,3KOHM+-1%TK50 RESISTOR | RL | 083.1574 | DRALORIC | SMA/207/24,3K-F-C | 238.4563 |
| R49 | RF 0,3 W 100 KOHM +-5% DEPOS.-CARBON RESISTOR | | 028.2850 | BEYSCHLAG | SBC0309/100K5% | 238.4563 |
| R50 | RF 0,3W10 KOHM+-5% DEPOS.-CARBON RESISTOR | | 028.2643 | BEYSCHLAG | SBC0309/10K5% | 238.4563 |
| R51 | RF 0,3W 1KOHM+-5% DEPOS.-CARBON RESISTOR | | 028.2437 | BEYSCHLAG | SBC0309/1K5% | 238.4563 |
| R52 | RF 0,3W 1000HM +-5% DEPOS.-CARBON RESISTOR | | 028.2220 | BEYSCHLAG | SBC0309/1000HM5% | 238.4563 |
| R53 | RL 0,35W4,75MOHM+-1%TK50 METALFILMRESISTOR | RL | 099.8250 | RESISTA | MK2 4,75MOHM 1% TK50 | 238.4563 |
| RS1 | SN 12V 1XU AU-CO MONOSTAB RELAY | SN | 063.7083 | SDS | RS-12V | 238.4563 |
| ST4 | FM STECKERLEISTE 10POL. 10-PIN INSERT | | 018.5127 | AMPHENOL | T2609000 | |
| ST15 | FJ EINBAUSTECKER SYST.SMB FIXED CONNECTOR | FJ | 063.5116 | ROSENBERG | 59S601-200D2 | |
| ST16 | FJ EINBAUSTECKER SYST.SMB FIXED CONNECTOR | FJ | 063.5116 | ROSENBERG | 59S601-200D2 | |
| ST17 | FJ EINBAUSTECKER SYST.SMB FIXED CONNECTOR | FJ | 063.5116 | ROSENBERG | 59S601-200D2 | |
| T1 | AK BCY59IX N 45V 200MA TRANSISTOR | AK | 010.5163 | VALVO | BCY59IX | 238.4563 |
| T2 | AM BF246A N-D 25V JFET FET | | 010.8691 | VALVO | BF246A | 238.4563 |
| T3 | AK 2N2905 P 40V 600MA TRANSISTOR | | 010.3383 | TEXAS | 2N2905 | 238.4563 |
| T4 | AK BCY59IX N 45V 200MA TRANSISTOR | AK | 010.5163 | VALVO | BCY59IX | 238.4563 |
| T5 | AM BF246A N-D 25V JFET FET | | 010.8691 | VALVO | BF246A | 238.4563 |
| Y11 | ED VERSTAERKERPLATTE AMPLIFIER | | 216.0771.02 | | | 238.4563 |
| | | | | | | - ENDE - |

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| Kennz. Comp.No. | Benennung Designation | Sachnummer Stock No. | Hersteller Manufacturer | Bezeichnung Designation | enthalten in contained in |
|---|---|---|---|---|---|
| C1 | CC 10 NF+-10%100V5K 1200LR<br>CAPACITOR | 092.0654 | AEROVOX | CKR05BX103KLEVELR | |
| N1 | BO LT1012MH PREC OPAMP<br>OPERATIONAL AMPLIFIER | 216.0807 | LINEAR TEC | LT1012MH | |
| R1 | RL 0,35W 1MOHM+-1%TK50<br>RESISTOR | RL 082.7862 | DRALORIC | SMA0207/1M-F-D | |
| X1<br>..7 | VL WIRE-WRAP PIN<br>WIRE-WRAP PIN | VL 088.5684 | BERG | NR. 75 403-013 | |
| | | | | | - ENDE - |

Für diese Unterlage behalten wir uns alle Rechte vor

| ROHDE & SCHWARZ | Äl | Datum Date | Schaltteilliste für Parts list for | Sachnummer Stock Nr. | Blatt Page |
|---|---|---|---|---|---|
| | 01 | 0988 | ED VERSTAERKERPLATTE<br>AMPLIFIER | 216.0771.01 SA | 1- |

| ROHDE&SCHWARZ | ÄZ | Datum Date | Schaltteilliste für Parts list for | Sachnummer Stock No. | Blatt Page |
|---|---|---|---|---|---|
| | 15 | 0384 | HF-EINHEIT<br>RF UNIT | 238.5001 SA | 1 |

| Kennzeichen Component No. | Benennung/Beschreibung Designation | Sachnummer Stock No. | enthalten in contained in |
|---|---|---|---|
| . | ZUGEH.STROML./CIRC.DIAGR.<br>238.5001 S | | |
| B1 | BL SN5473J ZX JK-FLIPFLOP<br>IC FLIP FLOP SN5473J<br>TEXAS SN5473J | BL 417.8290 | 238.5147 |
| B2 | BL SN5493AJ COUNTER 32MHZ<br>IC COUNTER SN5493AJ<br>TEXAS SN5493AJ | BL 086.9547 | 238.5147 |
| B3 | BL SN49831N 2/5INP.NANDG.<br>IC NAND GATE SN49831<br>TEXAS SN49831N | 238.5160 | 238.5147 |
| B4 | BL SN5472J JK-FLIPFLOP<br>IC FLIP-FLOP SN5472J<br>TEXAS SN5472J | BL 493.9571 | 238.5147 |
| C1 | CC 1 NF+50-20%5HDK4000<br>CERAMIC CAPACITOR<br>VALVO 2222 655 53102 | 006.0490 | 238.5147 |
| C2 | CE 22 UF+-20%35V12X 7X11<br>ELECTROLYTIC CAPACITOR<br>ERO-TANTAL TA-ELKOETR4/22/35 | CE 022.8227 | 238.5147 |
| C3 | CC 10PF+-10%200V5K1200VIE<br>CAPACITOR<br>AEROVOX CKR05BX100KLEVELL<br>TRIMMWERT<br>KERAMIK-VIELSCHICHT-KOND. | CC 084.5138 | 238.5147 |
| C4 | CC 82PF+- 5%100V NPO VIEL<br>CERAMIC CAPACITOR<br>UNIONCARB C052C820J2G1CA | CC 060.0765 | 238.5147 |
| C5 | CK 470NF+-20%100VQUADER<br>ELECTROLYTIC CAPACITOR<br>ROEDERST MKT1822-447/0 | CK 006.5079 | 238.5147 |
| C6 | CK 470NF+-20%100VQUADER<br>ELECTROLYTIC CAPACITOR<br>ROEDERST MKT1822-447/0 | CK 006.5079 | 238.5147 |
| C7 | CC 27PF+- 5%100V NPO VIEL<br>CERAMIC CAPACITOR<br>UNIONCARB C052C270J2G1CA | CC 060.0707 | 238.5147 |
| C8 | CC 100NF+-10%100V K1200VI<br>CERAMIC CAPACITOR<br>AEROVOX CKR06BX104KL | CC 060.1149 | 238.5147 |
| C9 | CC 82PF+-10%200V5K1200VIE<br>CAPACITOR<br>AEROVOX CKR05BX820KLEVELL<br>TRIMMWERT<br>KERAMIK-VIELSCHICHT-KOND. | CC 084.5244 | 238.5147 |
| C10 | CC 27PF+- 5%100V NPO VIEL<br>CERAMIC CAPACITOR<br>UNIONCARB C052C270J2G1CA | CC 060.0707 | 238.5147 |
| C11 | CC 220PF+-10%100V K1200VI<br>CAPACITOR<br>AEROVOX CKR05BX221KLEVELL<br>TRIMMWERT<br>KERAMIK-VIELSCHICHT-KOND. | CC 060.1078 | 238.5147 |
| C12 | CE 22 UF+-20%35V12X 7X11 | CE 022.8227 | 238.5147 |



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| Kennzeichen Component No. | Benennung/Beschreibung Designation | Sachnummer Stock No. | enthalten in contained in |
|---|---|---|---|
| | ELECTROLYTIC CAPACITOR<br>ERO-TANTAL TA-ELKOETR4/22/35 | | |
| C13 | CC 1 NF+50-20%5HDK4000<br>CERAMIC CAPACITOR<br>VALVO 2222 655 53102 | 006.0490 | 238.5147 |
| C14 | CC 5 PF+-0,5PF5N033<br>CERAMIC CAPACITOR<br>DRALORIC N033/IB5/0,5SDPN<br>TRIMMWERT<br>KERAMIK-VIELSCHICHT.KOND. | CC 006.0131 | 238.5147 |
| C15 | CC 56PF+- 5%100V VIEL<br>CERAMIC CAPACITOR<br>UNIONCARB C052C560J2G1CA | CC 060.0742 | 238.5147 |
| C16 | CC 270PF+- 5%100V NPO VIE<br>CERAMIC CAPACITOR<br>UNIONCARB C052C271J2G1CA | CC 060.0820 | 238.5147 |
| C17 | CE 22 UF+-20%35V12X 7X11<br>ELECTROLYTIC CAPACITOR<br>ERO-TANTAL TA-ELKOETR4/22/35 | CE 022.8227 | 238.5147 |
| C18 | CC 120PF+-10%200V5K1200VI<br>CAPACITOR<br>AEROVOX CKR05BX121KLEVELL<br>TRIMMWERT<br>KERAMIK-VIELSCHICHT-KOND. | CC 084.5267 | 238.5147 |
| C19 | CC 180PF+-10%100V K1200VI<br>CAPACITOR<br>AEROVOX CKR05BX181KL<br>TRIMMWERT<br>KERAMIK-VIELSCHICHT.KOND. | CC 060.1061 | 238.5147 |
| C20 | CC 27PF+-10%200V5K1200VIE<br>CAPACITOR<br>AEROVOX CKR05BX270KLEVELL<br>TRIMMWERT<br>KERAMIK-VIELSCHICHT.KOND. | CC 084.5180 | 238.5147 |
| C21 | CC 1 NF+50-20%5HDK4000<br>CERAMIC CAPACITOR<br>VALVO 2222 655 53102 | 006.0490 | 238.5147 |
| C22 | CE 22 UF+-20%35V12X 7X11<br>ELECTROLYTIC CAPACITOR<br>ERO-TANTAL TA-ELKOETR4/22/35 | CE 022.8227 | 238.5147 |
| C25 | CK 100NF+-20%100V QUADER<br>PLASTIC-FOIL CAPACITOR<br>ROEDERST MKT1822-410/0 | CK 006.5033 | 238.5147 |
| C26 | CE 100UF+-20%10V12X 7X11<br>ELECTROLYTIC CAPACITOR<br>ERO-TANTAL TA-ELKOETR4100/10 | CE 022.8062 | 238.5147 |
| C27 | CC 10PF+-10%200V5K1200VIE<br>CAPACITOR<br>AEROVOX CKR05BX100KLEVELL<br>TRIMMWERT<br>KERAMIK-VIELSCHICHT-KOND. | CC 084.5138 | 238.5147 |
| C28 | CC 22 NF+- 5%100V NPO VIE<br>CAPACITOR<br>SANFERNAN B108BY223JD | CC 060.1055 | 238.5147 |
| C29 | CC 180PF+- 5%100V NPO VIE<br>CERAMIC CAPACITOR<br>UNIONCARB C052C181J2G1CA | CC 060.0807 | 238.5147 |

| Kennzeichen Component No. | Benennung/Beschreibung Designation | Sachnummer Stock No. | enthalten in contained in |
|---|---|---|---|
| C30 | TRIMMWERT<br>KERAMIK-VIELSCHICHT.KOND. | | 238.5147 |
| C31 | CE 22 UF+-20%35V12X 7X11<br>ELECTROLYTIC CAPACITOR<br>ERO-TANTAL TA-ELKOETR4/22/35 | CE 022.8227 | 238.5147 |
| C35 | CB 5NF+-20% HDK<br>FEED-THROUGH CAPACITOR<br>ERIE 2499-003-X5W0-502M | CB 067.0648 | |
| C36 | CB 5NF+-20% HDK<br>FEED-THROUGH CAPACITOR<br>ERIE 2499-003-X5W0-502M | CB 067.0648 | |
| C37 | CB 5NF+-20% HDK<br>FEED-THROUGH CAPACITOR<br>ERIE 2499-003-X5W0-502M | CB 067.0648 | |
| GL1 | AD 1N4151 50V 0,2 A UDI<br>DIODE<br>AEG-TELEF 1N4151 | AD 012.0723 | 238.5147 |
| GL2 | AE BA121 12/ 4PF CDI<br>TUNING DIODE<br>AEG-TELEF BA121 | AE 012.6121 | 238.5147 |
| GL3 | AE BA121 12/ 4PF CDI<br>TUNING DIODE<br>AEG-TELEF BA121 | AE 012.6121 | 238.5147 |
| GL4 | AE BZX79/C5V6 0,5W Z-DI<br>ZENER DIODE<br>VALVO BZX79/C5V6 | AE 012.2455 | 238.5147 |
| GL5 | AE BZX79/C5V6 0,5W Z-DI<br>ZENER DIODE<br>VALVO BZX79/C5V6 | AE 012.2455 | 238.5147 |
| L1 | LD 150UH BEI 0,17A 6,20HM<br>CHOKE<br>JAHRE 74.11-1500K | LD 026.3388 | 238.5147 |
| L2 | LD 150UH BEI 0,17A 6,20HM<br>CHOKE<br>JAHRE 74.11-1500K | LD 026.3388 | 238.5147 |
| L3 | SPULE | 238.5176 | 238.5147 |
| L4 | LD 150UH BEI 0,17A 6,20HM<br>CHOKE<br>JAHRE 74.11-1500K | LD 026.3388 | 238.5147 |
| L5 | SPULE<br>COIL | 238.5182 | 238.5147 |
| L6 | LD 150UH BEI 0,17A 6,20HM<br>CHOKE<br>JAHRE 74.11-1500K | LD 026.3388 | 238.5147 |
| L7 | LD 4,7UH BEI1,35A0,2420HM<br>CHOKE<br>JAHRE 74.11-4R70K | LD 026.3207 | 238.5147 |
| L8 | LD 150UH BEI 0,17A 6,20HM<br>CHOKE<br>JAHRE 74.11-1500K | LD 026.3388 | 238.5147 |
| L9 | LD 150UH BEI 0,17A 6,20HM<br>CHOKE<br>JAHRE 74.11-1500K | LD 026.3388 | 238.5147 |
| L10 | LD 150UH BEI 0,17A 6,20HM<br>CHOKE | LD 026.3388 | 238.5147 |



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| Kennzeichen Component No. | Benennung/Beschreibung Designation | Sachnummer Stock No. | enthalten in contained in |
|---|---|---|---|
| | JAHRE 74.11-1500K | | |
| R1 | RL 0,1W 2210HM+-1%TK50 RESISTOR DALE MF1/10 221 OHM1%TK50 | RL 067.4372 | 238.5147 |
| R2 | RL 0,1W 4,75KOHM+-1%TK50 RESISTOR DALE MF1/10 4,75K 1%TK50 | RL 067.4695 | 238.5147 |
| R3 | RL 0,1W 2,67KOHM+-1%TK50 RESISTOR DALE MF1/10 2,67K 1%TK50 | RL 067.4637 | 238.5147 |
| R4 | RL 0,1W 1000HM+-1%TK50 RESISTOR DALE MF1/10 100 OHM1%TK50 | RL 067.4295 | 238.5147 |
| R5 | RL 0,1W 1000HM+-1%TK50 RESISTOR DALE MF1/10 100 OHM1%TK50 | RL 067.4295 | 238.5147 |
| R6 | RL 0,1W 2210HM+-1%TK50 RESISTOR DALE MF1/10 221 OHM1%TK50 | RL 067.4372 | 238.5147 |
| R7 | RL 0,1W 100KOHM+-1%TK50 RESISTOR DALE MF1/10 100K 1%TK50 | RL 067.5010 | 238.5147 |
| R8 | RL 0,1W 100KOHM+-1%TK50 RESISTOR DALE MF1/10 100K 1%TK50 | RL 067.5010 | 238.5147 |
| R9 | TRIMMWERT / SELECTED WIDERST.0,3W | | 238.5147 |
| R10 | RL 0,1W 1000HM+-1%TK50 RESISTOR DALE MF1/10 100 OHM1%TK50 | RL 067.4295 | 238.5147 |
| R11 | RL 0,1W 5620HM+-1%TK50 RESISTOR DALE MF1/10 562 OHM1%TK50 | RL 067.4472 | 238.5147 |
| R12 | RL 0,1W 1000HM+-1%TK50 RESISTOR DALE MF1/10 100 OHM1%TK50 | RL 067.4295 | 238.5147 |
| R13 | RL 0,1W 1500HM+-1%TK50 RESISTOR DALE MF1/10 150 OHM1%TK50 | RL 067.4337 | 238.5147 |
| R14 | RL 0,1W 2210HM+-1%TK50 RESISTOR DALE MF1/10 221 OHM1%TK50 | RL 067.4372 | 238.5147 |
| R15 | RL 0,1W 2210HM+-1%TK50 RESISTOR DALE MF1/10 221 OHM1%TK50 | RL 067.4372 | 238.5147 |
| R16 | RL 0,1W 3,92KOHM+-1%TK50 RESISTOR DALE MF1/10 3,92K 1%TK50 | RL 067.4672 | 238.5147 |
| R17 | RL 0,1W 1000HM+-1%TK50 RESISTOR DALE MF1/10 100 OHM1%TK50 | RL 067.4295 | 238.5147 |
| R18 | RL 0,1W 8250HM+-1%TK50 RESISTOR DALE MF1/10 825 OHM1%TK50 | RL 067.4514 | 238.5147 |
| R19 | RL 0,1W 1000HM+-1%TK50 RESISTOR | RL 067.4295 | 238.5147 |

| Kennzeichen Component No. | Benennung/Beschreibung Designation | Sachnummer Stock No. | enthalten in contained in |
|---|---|---|---|
| | DALE MF1/10 100 OHM1%TK50 | | |
| R20 | RL 0,1W 267OHM+-1%TK50 | RL 067.4395 | 238.5147 |
| | RESISTOR | | |
| | DALE MF1/10 267 OHM1%TK50 | | |
| R21 | RL 0,1W 475OHM+-1%TK50 | RL 067.4450 | 238.5147 |
| | RESISTOR | | |
| | DALE MF1/10 475 OHM1%TK50 | | |
| R22 | RL 0,1W 475OHM+-1%TK50 | RL 067.4450 | 238.5147 |
| | RESISTOR | | |
| | DALE MF1/10 475 OHM1%TK50 | | |
| R23 | RL 0,1W 2,21KOHM+-1%TK50 | RL 067.4614 | 238.5147 |
| | RESISTOR | | |
| | DALE MF1/10 2,21K 1%TK50 | | |
| R24 | RL 0,1W 10,00HM+-1%TK50 | RL 067.4050 | 238.5147 |
| | RESISTOR | | |
| | DALE MF1/10 10,00HM1%TK50 | | |
| R25 | RL 0,1W 182OHM+-1%TK50 | RL 067.4350 | 238.5147 |
| | RESISTOR | | |
| | DALE MF1/10 182 OHM1%TK50 | | |
| R26 | RL 0,1W 47,50HM+-1%TK50 | RL 067.4214 | 238.5147 |
| | RESISTOR | | |
| | DALE MF1/10 47,50HM1%TK50 | | |
| R27 | RL 0,1W 10,00HM+-1%TK50 | RL 067.4050 | 238.5147 |
| | RESISTOR | | |
| | DALE MF1/10 10,00HM1%TK50 | | |
| R28 | RL 0,1W 10,00HM+-1%TK50 | RL 067.4050 | 238.5147 |
| | RESISTOR | | |
| | DALE MF1/10 10,00HM1%TK50 | | |
| R29 | RR 0,6W 5KOHM+-5%TK70LIEG | 238.5130 | 238.5147 |
| | RESISTOR | | |
| | DAYSTROM 502-00S/5K | | |
| R30 | RL 0,1W 1,00KOHM+-1%TK50 | RL 067.4537 | 238.5147 |
| | RESISTOR | | |
| | DALE MF1/10 1,00K 1%TK50 | | |
| R31 | RS 0,5W 4700HM+-20%KURVE1 | RS 066.8639 | 238.5147 |
| | DEPOS.-CARBON POTENTIOMET | | |
| | RUF 0650-655-470 OHM LIN | | |
| R32 | WIDERSTAND | 238.5230 | |
| R33 | RL 0,1W 2210HM+-1%TK50 | RL 067.4372 | 238.5147 |
| | RESISTOR | | |
| | DALE MF1/10 221 OHM1%TK50 | | |
| R35 | RL 0,1W 2210HM+-1%TK50 | RL 067.4372 | 238.5147 |
| | RESISTOR | | |
| | DALE MF1/10 221 OHM1%TK50 | | |
| R36 | RL 0,1W 475OHM+-1%TK50 | RL 067.4450 | 238.5147 |
| | RESISTOR | | |
| | DALE MF1/10 475 OHM1%TK50 | | |
| R37 | RL 0,1W 1000HM+-1%TK50 | RL 067.4295 | 238.5147 |
| | RESISTOR | | |
| | DALE MF1/10 100 OHM1%TK50 | | |
| R38 | RL 0,1W 4,75KOHM+-1%TK50 | RL 067.4695 | 238.5147 |
| | RESISTOR | | |
| | DALE MF1/10 4,75K 1%TK50 | | |
| R39 | RL 0,1W 22,1KOHM+-1%TK50 | RL 067.4850 | 238.5147 |
| | RESISTOR | | |
| | DALE MF 1/10 22,1K 1%TK50 | | |
| R40 | RL 0,1W 2,67KOHM+-1%TK50 | RL 067.4637 | 238.5147 |



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| Kennzeichen Component No. | Benennung/Beschreibung Designation | Sachnummer Stock No. | enthalten in contained in |
|---|---|---|---|
| | RESISTOR DALE MF1/10 2,67K 1%TK50 | | |
| R41 | RL 0,1W 10,00HM+-1%TK50 | RL 067.4050 | 238.5147 |
| | RESISTOR DALE MF1/10 10,00HM1%TK50 | | |
| R42 | RL 0,1W 4750HM+-1%TK50 | RL 067.4450 | 238.5147 |
| | RESISTOR DALE MF1/10 475 0HM1%TK50 | | |
| R43 | RL 0,1W 1000HM+-1%TK50 | RL 067.4295 | 238.5147 |
| | RESISTOR DALE MF1/10 100 0HM1%TK50 | | |
| R44 | RL 0,1W 8,25K0HM+-1%TK50 | RL 067.4750 | 238.5147 |
| | RESISTOR DALE MF1/10 8,25K 1%TK50 | | |
| R45 | RL 0,1W 1,00K0HM+-1%TK50 | RL 067.4537 | 238.5147 |
| | RESISTOR DALE MF1/10 1,00K 1%TK50 | | |
| R46 | RL 0,1W 10,00HM+-1%TK50 | RL 067.4050 | 238.5147 |
| | RESISTOR DALE MF1/10 10,00HM1%TK50 | | |
| R47 | RL 0,1W 2210HM+-1%TK50 | RL 067.4372 | 238.5147 |
| | RESISTOR DALE MF1/10 221 0HM1%TK50 | | |
| R48 | RL 0,1W 5620HM+-1%TK50 | RL 067.4472 | 238.5147 |
| | RESISTOR DALE MF1/10 562 0HM1%TK50 | | |
| R49 | RL 0,1W 10,00HM+-1%TK50 | RL 067.4050 | 238.5147 |
| | RESISTOR DALE MF1/10 10,00HM1%TK50 | | |
| R50 | RL 0,1W 2210HM+-1%TK50 | RL 067.4372 | 238.5147 |
| | RESISTOR DALE MF1/10 221 0HM1%TK50 | | |
| ST2 | FM STECKERLEISTE 10POL. 10-PIN INSERT AMPHENOL T2609000 | 018.5127 | |
| ST5 | FJ EINBAUSTECKER SYST.SMB FIXED CONNECTOR RADIALL R.114 553 | FJ 063.5116 | |
| ST6 | FJ EINBAUSTECKER SYST.SMB FIXED CONNECTOR RADIALL R.114 553 | FJ 063.5116 | |
| ST7 | FJ EINBAUSTECKER SYST.SMB FIXED CONNECTOR RADIALL R.114 553 | FJ 063.5116 | |
| T1 | AK 2N708M NPN 40V 200MA TRANSISTOR MOTOROLA 2N708 | 010.4480 | 238.5147 |
| T2 | AK 2N3866 NPN 55V 400MA TRANSISTOR RCA 2N3866 | AK 010.0926 | 238.5147 |
| T3 | AK BF115 NPN 50V 30MA TRANSISTOR VALVO BF115 | 010.4850 | 238.5147 |
| BIS/TO T7 | | | |

| Kennzeichen Component No. | Benennung/Beschreibung Designation | Sachnummer Stock No. | enthalten in contained in |
|---|---|---|---|
| T8 | AK 2N3866 NPN 55V 400MA TRANSISTOR RCA 2N3866 | AK 010.0926 | 238.5147 |
| T9 | AK 2N708M NPN 40V 200MA TRANSISTOR MOTOROLA 2N708 | 010.4480 | 238.5147 |
| T11 | AK BCY59IX NPN 45V 200MA TRANSISTOR SIEMENS BCY59IX | AK 010.5163 | 238.5147 |
| T12 | AK BCY59IX NPN 45V 200MA TRANSISTOR SIEMENS BCY59IX | AK 010.5163 | 238.5147 |
| T13 | AK 2N708M NPN 40V 200MA TRANSISTOR MOTOROLA 2N708 | 010.4480 | 238.5147 |
| T14 | AK BCY59IX NPN 45V 200MA TRANSISTOR SIEMENS BCY59IX | AK 010.5163 | 238.5147 |
| T15 | AK BCY59IX NPN 45V 200MA TRANSISTOR SIEMENS BCY59IX | AK 010.5163 | 238.5147 |
| T16 | AL 2N3375 NPN 40V 1A5 TRANSISTOR RCA 2N3375 | AL 010.1000 | |
| TR1 | UEBERTRAGER TRANSFORMER | 238.5199 | 238.5147 |
| TR2 | UEBERTRAGER TRANSFORMER | 238.5201 | 238.5147 |
| TR3 | UEBERTRAGER TRANSFORMER | 238.5201 | 238.5147 |
| TR4 | UEBERTRAGER TRANSFORMER | 238.5218 | 238.5147 |
| TR5 | UEBERTRAGER TRANSFORMER | 238.5224 | 238.5147 |

- ENDE -

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| Kennz. Comp.No. | Benennung Designation | Sachnummer Stock No. | Hersteller Manufacturer | Bezeichnung Designation | enthalten in contained in |
|---|---|---|---|---|---|
| B1 | BO UA741 OPAMP<br>OPERATIONAL AMPLIFIER | 009.1251 | NSC | UA741AHM | 238.6737 |
| B2 | AL BDX34B P 80V DARL<br>TRANSISTOR | AL 092.9339 | RCA | BDX34B | 238.6050 |
| B3 | AL BDX34B P 80V DARL<br>TRANSISTOR | AL 092.9339 | RCA | BDX34B | 238.6050 |
| B30 | BO UA741 OPAMP<br>OPERATIONAL AMPLIFIER | 009.1251 | NSC | UA741AHM | 238.6920 |
| B50 | BO UA741 OPAMP<br>OPERATIONAL AMPLIFIER | 009.1251 | NSC | UA741AHM | 238.6850 |
| B51 | BO UA741 OPAMP<br>OPERATIONAL AMPLIFIER | 009.1251 | NSC | UA741AHM | 238.6850 |
| B80 | AL BDX34B P 80V DARL<br>TRANSISTOR | AL 092.9339 | RCA | BDX34B | |
| C1 | CC 100NF+-10%100V K1200VI<br>CERAMIC CAPACITOR | 060.1149 | UNION CARB | CKO6BX104K | 238.6737 |
| C2 | CE 4,7UF+-20%20V 7X 4X 8<br>ELECTROLYTIC CAPACITOR | CE 022.8110 | ROEDERSTEI | ETR 2 4,7/20 20% | 238.6737 |
| C3 | CC 100NF+-10%100V K1200VI<br>CERAMIC CAPACITOR | 060.1149 | UNION CARB | CKO6BX104K | 238.6737 |
| C4 | CE 22 UF+-20%35V12X 7X11<br>ELECTROLYTIC CAPACITOR | CE 022.8227 | ROEDERSTEI | ETR 4 22/40 20% | 238.6737 |
| C5 | CC 100NF+-10%100V K1200VI<br>CERAMIC CAPACITOR | 060.1149 | UNION CARB | CKO6BX104K | 238.6737 |
| C31 | CC 100NF+-10%100V K1200VI<br>CERAMIC CAPACITOR | 060.1149 | UNION CARB | CKO6BX104K | 238.6920 |
| C32 | CE 4,7UF+-20%20V 7X 4X 8<br>ELECTROLYTIC CAPACITOR | CE 022.8110 | ROEDERSTEI | ETR 2 4,7/20 20% | 238.6920 |
| C33 | CE 22 UF+-20%35V12X 7X11<br>ELECTROLYTIC CAPACITOR | CE 022.8227 | ROEDERSTEI | ETR 4 22/40 20% | 238.6920 |
| C50 | CE 22 UF+-20%35V12X 7X11<br>ELECTROLYTIC CAPACITOR | CE 022.8227 | ROEDERSTEI | ETR 4 22/40 20% | 238.6850 |
| C51 | CE 22 UF+-20%35V12X 7X11<br>ELECTROLYTIC CAPACITOR | CE 022.8227 | ROEDERSTEI | ETR 4 22/40 20% | 238.6850 |
| C70 | MZ PLATTE | 238.6189 | | | 238.6050 |
| C80 | CT 29 PF TAUCHTR.RD 8X25<br>AIR-TYPE TRIMMER | CT 025.7380 | TEKELEC | LUFTTR.AT5601 | 238.5947 |
| C81 | CC 10 NF +100%HDK6000<br>CERAMIC CAPACITOR | 022.0678 | VALVO | 2222 640 53103 | |
| C82<br>..89 | CB 5NF+80%-20% HDK<br>FEED-THROUGH CAPACITOR | 067.0648 | ERIE | 2499-003-X5W0-502Z | |
| GL1 | AE BZX79/C12 0,5W ZDI<br>ZENER DIODE | AE 012.2532 | VALVO | BZX55/C12 BZX79... | 238.6737 |
| GL2 | AD 1N4151 50V 0A2 UDI<br>DIODE | AD 012.0723 | AEG-TELEF. | 1N4151 | 238.6737 |
| GL30 | AE BZX79/C12 0,5W ZDI<br>ZENER DIODE | AE 012.2532 | VALVO | BZX55/C12 BZX79... | 238.6920 |
| GL50 | AE 1N823 6,2V REFDI<br>REFERENCE DIODE | 012.2278 | CDI | 1N823 | 238.6850 |
| GL51 | AE BZX79/C15 0,5W ZDI<br>ZENER DIODE | AE 012.2555 | VALVO | BZX79/C15 GEGURTET | 238.6850 |
| GL53 | AE BZX55/B5V1 0,5W ZDI<br>ZENER DIODE | AE 262.5837 | VALVO | BZX55/B5V1 | 238.6850 |
| GL70 | AF BPY12 20V FOTODIODE<br>PHOTO DIODE | 238.6437 | SIEMENS | BPY12 | 238.6714 |
| GL71 | AE 5082-0253 25V STEPRDI<br>DIODE | AE 012.8060 | HEWLETT-P. | 5082-0253 | 238.6050 |
| GL80 | AD 1N4151 50V 0A2 UDI<br>DIODE | AD 012.0723 | AEG-TELEF. | 1N4151 | |
| GL81 | AD 1N4151 50V 0A2 UDI<br>DIODE | AD 012.0723 | AEG-TELEF. | 1N4151 | |
| K1 | DX HF-KABEL | 238.7027 | | | 238.7010 |
| L1 | LD 15UH 10% 1R2 0,46A<br>CHOKE | LD 026.4149 | JAHRE | 72.10-15R0 K | 238.6737 |
| L2 | LD 15UH 10% 1R2 0,46A<br>CHOKE | LD 026.4149 | JAHRE | 72.10-15R0 K | 238.6737 |
| L3 | LD 15UH 10% 1R2 0,46A<br>CHOKE | LD 026.4149 | JAHRE | 72.10-15R0 K | 238.6737 |
| L31 | LD 15UH 10% 1R2 0,46A<br>CHOKE | LD 026.4149 | JAHRE | 72.10-15R0 K | 238.6920 |
| L70 | LD SPULE<br>COIL | 238.6066 | | | 238.6050 |
| L80 | LD 3,3UH BEI 1,63A0,160HM<br>CHOKE | LD 026.4061 | JAHRE | 72.10-3R30K | |

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| Kennz. Comp.No. | Benennung Designation | Sachnummer Stock No. | Hersteller Manufacturer | Bezeichnung Designation | enthalten in contained in |
|---|---|---|---|---|---|
| L81 | LD SPULE | 238.5824 | | | 238.5801 |
| L82 | LD 220NH 20% 0R04 2A CHOKE | LD 026.3720 | JAHRE | 72.10-R220M | |
| L83 | LD 0,68UH BEI1,63A0,150HM CHOKE TRIMMWERT" | LD 026.3759 | JAHRE | 72.10-R680M | |
| L84 | LD 3,3UH BEI 1,63A0,160HM CHOKE | LD 026.4061 | JAHRE | 72.10-3R30K | |
| L85 | LD 3,3UH BEI 1,63A0,160HM CHOKE | LD 026.4061 | JAHRE | 72.10-3R30K | |
| R1 | DD R-DRAHT RD0,3 LACK MN WIRE ENTHALTEN IN 0238.6766 | DD 030.2224 | HEERMANN | K-BLATT DD2501 | 238.6737 |
| R1 | DD R-DRAHT RD0,3 LACK MN WIRE L = 59MM | DD 030.2224 | HEERMANN | K-BLATT DD2501 | 238.6766 |
| R2 | DD R-DRAHT RD0,3 LACK MN WIRE ENTHALTEN IN 0238.6766 | DD 030.2224 | HEERMANN | K-BLATT DD2501 | 238.6737 |
| R2 | DD R-DRAHT RD0,3 LACK MN WIRE L = 47,5MM | DD 030.2224 | HEERMANN | K-BLATT DD2501 | 238.6766 |
| R3 | RR 0,6W 10K0HM+-5%STEH. RESISTOR | 238.6750 | VITROHM | 800-208 10K | 238.6737 |
| R4 | RL 0,1W 47,5K0HM+-1%TK50 RESISTOR | 067.4937 | DALE0 | MF1/10 47,5K 1%TK50 | 238.6737 |
| R5 | TRIMMWERT | | | | 238.6737 |
| R6 | RL 0,1W 10,0K0HM+-1%TK50 RESISTOR | 067.4772 | DALE | MF1/10 10,0K 1%TK50 | 238.6737 |
| R7 | RL 0,1W 10,0K0HM+-1%TK50 RESISTOR | 067.4772 | DALE | MF1/10 10,0K 1%TK50 | 238.6737 |
| R8 | RL 0,1W 22,1K0HM+-1%TK50 RESISTOR | 067.4850 | DALE | MF 1/10 22,1K 1%TK50 | 238.6737 |
| R9 | RF 0,5W 1,5 K0HM+-5% DEPOS.-CARBON RESISTOR | 007.1390 | RESISTA | SK4/1,5K5% | 238.6737 |
| R10 | RL 0,1W 4750HM+-1%TK50 RESISTOR | 067.4450 | DALE | MF1/10 475 0HM1%TK50 | 238.6737 |
| R11 | DD R-DRAHT RD0,3 LACK MN WIRE L = 68 MM | DD 030.2224 | HEERMANN | K-BLATT DD2501 | |
| R12 | DD R-DRAHT RD0,3 LACK MN WIRE L=60 MM | DD 030.2224 | HEERMANN | K-BLATT DD2501 | |
| R13 | RL 0,1W 4750HM+-1%TK50 RESISTOR | 067.4450 | DALE | MF1/10 475 0HM1%TK50 | 238.6737 |
| R14 | RF 0,5 W 2,2 0HM+-5% DEPOS.-CARBON RESISTOR | RF 007.1054 | RESISTA | SK4/2,20HM5% | 238.6737 |
| R15 | RL 0,1W 3320HM+-1%TK50 RESISTOR | 067.4414 | DALE | MF1/10 332 0HM1%TK50 | 238.6737 |
| R16 | DD R-DRAHT RD0,3 LACK MN WIRE L = 65 MM | DD 030.2224 | HEERMANN | K-BLATT DD2501 | |
| R18 | RL 0,1W 25,5K0HM+-1%TK50 RESISTOR | 086.3561 | DALE | MF1/10 25,5K 1%TK50 | 238.6737 |
| R19 | RL 0,1W 3320HM+-1%TK50 RESISTOR | 067.4414 | DALE | MF1/10 332 0HM1%TK50 | 238.6737 |
| R20 | RF 0,5 W 2,2 0HM+-5% DEPOS.-CARBON RESISTOR | RF 007.1054 | RESISTA | SK4/2,20HM5% | 238.6737 |
| R21 | DD R-DRAHT RD0,3 LACK MN WIRE L = 63 MM | DD 030.2224 | HEERMANN | K-BLATT DD2501 | |
| R22 | RL 0,1W 47,5K0HM+-1%TK50 RESISTOR TRIMMWERT" | 067.4937 | DALE0 | MF1/10 47,5K 1%TK50 | 238.6737 |
| R23 | RL 0,1W 3,92K0HM+-1%TK50 RESISTOR | 067.4672 | DALE | MF1/10 3,92K 1%TK50 | 238.6737 |
| R24 | TRIMMWERT | | | | 238.6737 |
| R25 | RL 0,1W 25,5K0HM+-1%TK50 RESISTOR TRIMMWERT" | 086.3561 | DALE | MF1/10 25,5K 1%TK50 | 238.6737 |
| R26 | TRIMMWERT METALLSCH 0,15W | | | | 238.6737 |
| R27 | RL 0,1W 3,92K0HM+-1%TK50 RESISTOR TRIMMWERT" | 067.4672 | DALE | MF1/10 3,92K 1%TK50 | 238.6737 |
| R29 | RL 0,1W 4750HM+-1%TK50 RESISTOR | 067.4450 | DALE | MF1/10 475 0HM1%TK50 | 238.6737 |

| Kennz. Comp.No. | Benennung Designation | | Sachnummer Stock No. | Hersteller Manufacturer | Bezeichnung Designation | enthalten in contained in |
|---|---|---|---|---|---|---|
| R31 | RR 0,6W 10KOHM+-5%STEH. RESISTOR | | 238.6750 | VITROHM | 800-208 10K | 238.6920 |
| R32 | RL 0,1W 33,2KOHM+-1%TK50 RESISTOR | | 067.4895 | DALE | MF1/10 33,2K 1%TK50 | 238.6920 |
| R33 | RL 0,1W 39,2KOHM+-1%TK50 RESISTOR TRIMMW.-METALLSCH.0,15W" | | 067.4914 | DALE | MF1/10 39,2K 1%TK50 | 238.6920 |
| R34 | RL 0,1W 10,0KOHM+-1%TK50 RESISTOR | | 067.4772 | DALE | MF1/10 10,0K 1%TK50 | 238.6920 |
| R35 | RL 0,1W 10,0KOHM+-1%TK50 RESISTOR | | 067.4772 | DALE | MF1/10 10,0K 1%TK50 | 238.6920 |
| R36 | RL 0,1W 22,1KOHM+-1%TK50 RESISTOR | | 067.4850 | DALE | MF 1/10 22,1K 1%TK50 | 238.6920 |
| R37 | RF 0,5W 1,5 KOHM+-5% DEPOS.-CARBON RESISTOR | | 007.1390 | RESISTA | SK4/1,5K5% | 238.6920 |
| R38 | RF 0,5 W 1,8 OHM+-5% DEPOS.-CARBON RESISTOR | | 007.1048 | RESISTA | SK4/1,8OHM5% | 238.6920 |
| R39 | RL 0,1W 332OHM+-1%TK50 RESISTOR | | 067.4414 | DALE | MF1/10 332 OHM1%TK50 | 238.6920 |
| R40 | RL 0,1W 1,00KOHM+-1%TK50 RESISTOR | | 067.4537 | DALE | MF1/10 1,00K 1%TK50 | 238.6920 |
| R41 | RL 0,1W 1,00KOHM+-1%TK50 RESISTOR | | 067.4537 | DALE | MF1/10 1,00K 1%TK50 | 238.6920 |
| R50 | RL 0,1W 15,0KOHM+-1%TK50 RESISTOR | | 067.4814 | DALE | MF1/10 15,0K 1%TK50 | 238.6850 |
| R51 | RL 0,1W 8,25KOHM+-1%TK50 RESISTOR | | 067.4750 | DALE | MF1/10 8,25K 1%TK50 | 238.6850 |
| R52 | RL 0,1W 56,2KOHM+-1%TK50 RESISTOR TRIMMWERT" | | 067.4950 | DALE | MF1/10 56,2K 1%TK50 | 238.6850 |
| R53 | RL 0,1W 1,21KOHM+-1%TK50 RESISTOR | | 067.4550 | DALE | MF1/10 1,21K 1%TK50 | 238.6850 |
| R54 | RL 0,1W 1,00KOHM+-1%TK50 RESISTOR | | 067.4537 | DALE | MF1/10 1,00K 1%TK50 | 238.6850 |
| R55 | RL 0,1W 182OHM+-1%TK50 RESISTOR | | 067.4350 | DALE | MF1/10 182 OHM1%TK50 | 238.6850 |
| R56 | RL 0,1W 1,00KOHM+-1%TK50 RESISTOR | | 067.4537 | DALE | MF1/10 1,00K 1%TK50 | 238.6850 |
| R57 | RL 0,1W 5,62KOHM+-1%TK50 RESISTOR | | 067.4714 | DALE | MF1/10 5,62K 1%TK50 | 238.6850 |
| R70 | RK HEISSL150KOHM20%0,1W THERMISTOR BAUTEIL LAGERT IN 1GE! | | 238.7585.10 | | | 238.6466 |
| R71 | DD R-DRAHT RDO,3 LACK MN WIRE L=80 MM | DD | 030.2224 | HEERMANN | K-BLATT DD2501 | 238.6714 |
| R72 | DD R-DRAHT RDO,3 LACK MN WIRE L=80 MM | DD | 030.2224 | HEERMANN | K-BLATT DD2501 | 238.6714 |
| R73 | DD R-DRAHT RDO,3 LACK MN WIRE L=70 MM | DD | 030.2224 | HEERMANN | K-BLATT DD2501 | 238.6050 |
| R74 | DD R-DRAHT RDO,3 LACK MN WIRE L=70 MM | DD | 030.2224 | HEERMANN | K-BLATT DD2501 | 238.6050 |
| R75 | RK HEISSL 47KOHM 20%0,10W THERMISTOR | | 238.5624 | VALVO | HEISSL.232262721473 | 238.6566 |
| R80 | RL 0,1W 221OHM+-1%TK50 RESISTOR | | 067.4372 | DALE | MF1/10 221 OHM1%TK50 | |
| R81 | RF 0,5 W 8,2 OHM+-5% RESISTOR | | 007.1125 | RESISTA | SK4/8,2OHM5% | |
| R82 | RL 0,1W 1,21KOHM+-1%TK50 RESISTOR | | 067.4550 | DALE | MF1/10 1,21K 1%TK50 | |
| R83 | RK HEISSL470KOHM 20%0,10W THERMISTOR | | 238.5999 | VALVO | HEISSL.232262721474 | 238.5976 |
| R85 | DD R-DRAHT RDO,3 LACK MN WIRE L=25 MM | DD | 030.2224 | HEERMANN | K-BLATT DD2501 | |
| R86 | DD R-DRAHT RDO,3 LACK MN WIRE L=25 MM | DD | 030.2224 | HEERMANN | K-BLATT DD2501 | |
| R87 | DD R-DRAHT RDO,3 LACK MN WIRE L=25 MM | DD | 030.2224 | HEERMANN | K-BLATT DD2501 | |
| RL1 | XSRM-Z SPEKTRALLAMPE | | 103.0025 | | | |
| ST1 | FM STECKERLEISTE 10POL. 10-PIN INSERT | | 018.5127 | AMPHENOL | T2609000 | |

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| Kennz. Comp.No. | Benennung Designation | Sachnummer Stock No. | Hersteller Manufacturer | Bezeichnung Designation | enthalten in contained in |
|---|---|---|---|---|---|
| ST8 | FJ EINBAUSTECKER SYST.SMB FIXED CONNECTOR | FJ 063.5116 | ROSENBERG | 59S601-200D2 | |
| ST9 | FJ EINBAUSTECKER SYST.SMB FIXED CONNECTOR | FJ 063.5116 | ROSENBERG | 59S601-200D2 | |
| T1 | AK 2N2905 P 40V 600MA TRANSISTOR | 010.3383 | TEXAS | 2N2905 | 238.6737 |
| T30 | AK 2N2905 P 40V 600MA TRANSISTOR | 010.3383 | TEXAS | 2N2905 | 238.6920 |
| T50 | AK BCY59IX N 45V 200MA TRANSISTOR | AK 010.5163 | VALVO | BCY59IX | 238.6850 |
| T51 | AL BD236 P 60V 1A0 TRANSISTOR | AL 010.0361 | VALVO | BD236 | 238.6850 |
| T52 | AL BD235 N 60V 2A0 TRANSISTOR | 010.0903 | VALVO | BD235 | 238.6850 |
| T80 | AL 2N3375 N 40V 1A5 TRANSISTOR | 010.1000 | MOTOROLA | 2N3375 | |
| | | | | | - ENDE - |

| Kennz. Comp.No. | Benennung Designation | Sachnummer Stock No. | Hersteller Manufacturer | Bezeichnung Designation | enthalten in contained in |
|---|---|---|---|---|---|
| A | ZUGEHOERIGER STROMLAUF 238.7179 S | | | | |
| B1 | BO UA741 OPAMP OPERATIONAL AMPLIFIER | 009.1251 | NSC | UA741AHM | 216.0465 |
| B2 | AL BDX34B P 80V DARL TRANSISTOR | AL 092.9339 | RCA | BDX34B | 238.6050 |
| B3 | AL BDX34B P 80V DARL TRANSISTOR | AL 092.9339 | RCA | BDX34B | 238.6050 |
| B30 | BO UA741 OPAMP OPERATIONAL AMPLIFIER | 009.1251 | NSC | UA741AHM | 238.6920 |
| B50 | BO UA741 OPAMP OPERATIONAL AMPLIFIER | 009.1251 | NSC | UA741AHM | 238.6850 |
| B51 | BO UA741 OPAMP OPERATIONAL AMPLIFIER | 009.1251 | NSC | UA741AHM | 238.6850 |
| B80 | AL BDX34B P 80V DARL TRANSISTOR | AL 092.9339 | RCA | BDX34B | |
| C1 | CC 100NF+-10%100V K1200VI CERAMIC CAPACITOR | 060.1149 | UNION CARB | CK06BX104K | 216.0465 |
| C2 | CE 4,7UF+-20%20V 7X 4X 8 ELECTROLYTIC CAPACITOR | CE 022.8110 | ROEDERSTEI | ETR 2 4,7/20 20% | 216.0465 |
| C3 | CC 100NF+-10%100V K1200VI CERAMIC CAPACITOR | 060.1149 | UNION CARB | CK06BX104K | 216.0465 |
| C4 | CE 22 UF+-20%35V12X 7X11 ELECTROLYTIC CAPACITOR | CE 022.8227 | ROEDERSTEI | ETR 4 22/40 20% | 216.0465 |
| C5 | CC 100NF+-10%100V K1200VI CERAMIC CAPACITOR | 060.1149 | UNION CARB | CK06BX104K | 216.0465 |
| C31 | CC 100NF+-10%100V K1200VI CERAMIC CAPACITOR | 060.1149 | UNION CARB | CK06BX104K | 238.6920 |
| C32 | CE 4,7UF+-20%20V 7X 4X 8 ELECTROLYTIC CAPACITOR | CE 022.8110 | ROEDERSTEI | ETR 2 4,7/20 20% | 238.6920 |
| C33 | CE 22 UF+-20%35V12X 7X11 ELECTROLYTIC CAPACITOR | CE 022.8227 | ROEDERSTEI | ETR 4 22/40 20% | 238.6920 |
| C50 | CE 22 UF+-20%35V12X 7X11 ELECTROLYTIC CAPACITOR | CE 022.8227 | ROEDERSTEI | ETR 4 22/40 20% | 238.6850 |
| C51 | CE 22 UF+-20%35V12X 7X11 ELECTROLYTIC CAPACITOR | CE 022.8227 | ROEDERSTEI | ETR 4 22/40 20% | 238.6850 |
| C70 | MZ PLATTE | 238.6189 | | | 238.6050 |
| C80 | CT 29 PF TAUCHTR.RD 8X25 AIR-TYPE TRIMMER | CT 025.7380 | TEKELEC | LUFTTR.AT5601 | 238.5947 |
| C81 | CC 10 NF +100%HDK6000 CERAMIC CAPACITOR | 022.0678 | VALVO | 2222 640 53103 | |
| C82 ..89 | CB 5NF+80%-20% HDK FEED-THROUGH CAPACITOR | 067.0648 | ERIE | 2499-003-X5W0-502Z | |
| GL1 | AE BZX79/C12 0,5W ZDI ZENER DIODE | AE 012.2532 | VALVO | BZX55/C12 BZX79... | 216.0465 |
| GL2 | AD 1N4151 50V 0A2 UDI DIODE | AD 012.0723 | AEG-TELEF. | 1N4151 | 216.0465 |
| GL30 | AE BZX79/C12 0,5W ZDI ZENER DIODE | AE 012.2532 | VALVO | BZX55/C12 BZX79... | 238.6920 |
| GL50 | AE 1N823 6,2V REFDI REFERENCE DIODE | 012.2278 | CDI | 1N823 | 238.6850 |
| GL51 | AE BZX79/C15 0,5W ZDI ZENER DIODE | AE 012.2555 | VALVO | BZX79/C15 GEGURTET | 238.6850 |
| GL53 | AE BZX55/B5V1 0,5W ZDI ZENER DIODE | AE 262.5837 | VALVO | BZX55/B5V1 | 238.6850 |
| GL70 | AF BPY12 20V FOTODIODE PHOTO DIODE | 238.6437 | SIEMENS | BPY12 | 238.6714 |
| GL71 | AE 5082-0253 25V STEPRDI DIODE | AE 012.8060 | HEWLETT-P. | 5082-0253 | 238.6050 |
| GL80 | AD 1N4151 50V 0A2 UDI DIODE | AD 012.0723 | AEG-TELEF. | 1N4151 | |
| GL81 | AD 1N4151 50V 0A2 UDI DIODE | AD 012.0723 | AEG-TELEF. | 1N4151 | |
| K1 | DX HF-KABEL | 238.7027 | | | 238.7010 |
| L1 | LD 15UH 10% 1R2 0,46A CHOKE | LD 026.4149 | JAHRE | 72.10-15R0 K | 216.0465 |
| L2 | LD 15UH 10% 1R2 0,46A CHOKE | LD 026.4149 | JAHRE | 72.10-15R0 K | 216.0465 |
| L3 | LD 15UH 10% 1R2 0,46A CHOKE | LD 026.4149 | JAHRE | 72.10-15R0 K | 216.0465 |
| L31 | LD 15UH 10% 1R2 0,46A CHOKE | LD 026.4149 | JAHRE | 72.10-15R0 K | 238.6920 |



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| Kennz. Comp.No. | Benennung Designation | Sachnummer Stock No. | Hersteller Manufacturer | Bezeichnung Designation | enthalten in contained in |
|---|---|---|---|---|---|
| L70 | LD SPULE<br>COIL | 238.6066 | | | 238.6050 |
| L80 | LD 3,3UH BEI 1,63AO,16OHM<br>CHOKE | LD 026.4061 | JAHRE | 72.10-3R30K | |
| L81 | LD SPULE | 238.5824 | | | 238.5801 |
| L82 | LD 22ONH 20% OR04 2A<br>CHOKE | LD 026.3720 | JAHRE | 72.10-R22OM | |
| L83 | LD 0,68UH BEI1,63AO,15OHM<br>CHOKE<br>TRIMMWERT | LD 026.3759 | JAHRE | 72.10-R68OM | |
| L84 | LD 3,3UH BEI 1,63AO,16OHM<br>CHOKE | LD 026.4061 | JAHRE | 72.10-3R30K | |
| L85 | LD 3,3UH BEI 1,63AO,16OHM<br>CHOKE | LD 026.4061 | JAHRE | 72.10-3R30K | |
| R1 | DD R-DRAHT RDO,3 LACK MN<br>WIRE<br>L=6O MM | DD 030.2224 | HEERMANN | K-BLATT DD2501 | 216.0465 |
| R2 | DD R-DRAHT RDO,3 LACK MN<br>WIRE<br>L=5O MM | DD 030.2224 | HEERMANN | K-BLATT DD2501 | 216.0465 |
| R3 | RR 0,6W 10KOHM+-5%STEH.<br>RESISTOR | 238.6750 | VITROHM | 800-208 10K | 216.0465 |
| R4 | RL 0,1W 47,5KOHM+-1%TK50<br>RESISTOR | 067.4937 | DALEO | MF1/10 47,5K 1%TK50 | 216.0465 |
| R5 | TRIMMWERT / SELECTED<br>METALLSCHICHT 0,15W | | | | 216.0465 |
| R6 | RL 0,1W 10,0KOHM+-1%TK50<br>RESISTOR | 067.4772 | DALE | MF1/10 10,0K 1%TK50 | 216.0465 |
| R7 | RL 0,1W 10,0KOHM+-1%TK50<br>RESISTOR | 067.4772 | DALE | MF1/10 10,0K 1%TK50 | 216.0465 |
| R8 | RL 0,1W 22,1KOHM+-1%TK50<br>RESISTOR | 067.4850 | DALE | MF 1/10 22,1K 1%TK50 | 216.0465 |
| R9 | RF 0,5W 1,5 KOHM+-5%<br>DEPOS.-CARBON RESISTOR | 007.1390 | RESISTA | SK4/1,5K5% | 216.0465 |
| R10 | RL 0,1W 475OHM+-1%TK50<br>RESISTOR | 067.4450 | DALE | MF1/10 475 OHM1%TK50 | 216.0465 |
| R11 | DD R-DRAHT RDO,3 LACK MN<br>WIRE<br>L=62,5 MM | DD 030.2224 | HEERMANN | K-BLATT DD2501 | |
| R12 | DD R-DRAHT RDO,3 LACK MN<br>WIRE<br>L=6O MM | DD 030.2224 | HEERMANN | K-BLATT DD2501 | |
| R13 | RL 0,1W 475OHM+-1%TK50<br>RESISTOR | 067.4450 | DALE | MF1/10 475 OHM1%TK50 | 216.0465 |
| R14 | RF 0,5 W 2,2 OHM+-5%<br>DEPOS.-CARBON RESISTOR | RF 007.1054 | RESISTA | SK4/2,2OHM5% | 216.0465 |
| R15 | RL 0,1W 332OHM+-1%TK50<br>RESISTOR | 067.4414 | DALE | MF1/10 332 OHM1%TK50 | 216.0465 |
| R16 | DD R-DRAHT RDO,3 LACK MN<br>WIRE<br>L=65 MM | DD 030.2224 | HEERMANN | K-BLATT DD2501 | |
| R18 | RL 0,1W 25,5KOHM+-1%TK50<br>RESISTOR | 086.3561 | DALE | MF1/10 25,5K 1%TK50 | 216.0465 |
| R19 | RL 0,1W 332OHM+-1%TK50<br>RESISTOR | 067.4414 | DALE | MF1/10 332 OHM1%TK50 | 216.0465 |
| R20 | RF 0,5 W 2,2 OHM+-5%<br>DEPOS.-CARBON RESISTOR | RF 007.1054 | RESISTA | SK4/2,2OHM5% | 216.0465 |
| R21 | DD R-DRAHT RDO,3 LACK MN<br>WIRE<br>L=6O MM | DD 030.2224 | HEERMANN | K-BLATT DD2501 | |
| R22 | RL 0,1W 47,5KOHM+-1%TK50<br>RESISTOR | 067.4937 | DALEO | MF1/10 47,5K 1%TK50 | 216.0465 |
| R23 | RL 0,1W 3,92KOHM+-1%TK50<br>RESISTOR | 067.4672 | DALE | MF1/10 3,92K 1%TK50 | 216.0465 |
| R24 | TRIMMWERT / SELECTED<br>METALLSCHICHT 0,15W | | | | 216.0465 |
| R25 | RL 0,1W 25,5KOHM+-1%TK50<br>RESISTOR | 086.3561 | DALE | MF1/10 25,5K 1%TK50 | 216.0465 |
| R26 | TRIMMWERT / SELECTED<br>METALLSCHICHT 0,15W | | | | 216.0465 |
| R27 | RL 0,1W 3,92KOHM+-1%TK50<br>RESISTOR | 067.4672 | DALE | MF1/10 3,92K 1%TK50 | 216.0465 |
| R29 | RL 0,1W 475OHM+-1%TK50<br>RESISTOR | 067.4450 | DALE | MF1/10 475 OHM1%TK50 | 216.0465 |
| R31 | RR 0,6W 10KOHM+-5%STEH.<br>RESISTOR | 238.6750 | VITROHM | 800-208 10K | 238.6920 |

| Kennz. Comp.No. | Benennung Designation | | Sachnummer Stock No. | Hersteller Manufacturer | Bezeichnung Designation | enthalten in contained in |
|---|---|---|---|---|---|---|
| R32 | RL 0,1W 33,2KOHM+-1%TK50 RESISTOR | | 067.4895 | DALE | MF1/10 33,2K 1%TK50 | 238.6920 |
| R33 | RL 0,1W 39,2KOHM+-1%TK50 RESISTOR TRIMMW.-METALLSCH.0,15W" | | 067.4914 | DALE | MF1/10 39.2K 1%TK50 | 238.6920 |
| R34 | RL 0,1W 10,0KOHM+-1%TK50 RESISTOR | | 067.4772 | DALE | MF1/10 10,0K 1%TK50 | 238.6920 |
| R35 | RL 0,1W 10,0KOHM+-1%TK50 RESISTOR | | 067.4772 | DALE | MF1/10 10,0K 1%TK50 | 238.6920 |
| R36 | RL 0,1W 22,1KOHM+-1%TK50 RESISTOR | | 067.4850 | DALE | MF 1/10 22,1K 1%TK50 | 238.6920 |
| R37 | RF 0,5W 1,5 KOHM+-5% DEPOS.-CARBON RESISTOR | | 007.1390 | RESISTA | SK4/1,5K5% | 238.6920 |
| R38 | RF 0,5 W 1,8 OHM+-5% DEPOS.-CARBON RESISTOR | | 007.1048 | RESISTA | SK4/1,8OHM5% | 238.6920 |
| R39 | RL 0,1W 3320HM+-1%TK50 RESISTOR | | 067.4414 | DALE | MF1/10 332 OHM1%TK50 | 238.6920 |
| R40 | RL 0,1W 1,00KOHM+-1%TK50 RESISTOR | | 067.4537 | DALE | MF1/10 1,00K 1%TK50 | 238.6920 |
| R41 | RL 0,1W 1,00KOHM+-1%TK50 RESISTOR | | 067.4537 | DALE | MF1/10 1,00K 1%TK50 | 238.6920 |
| R50 | RL 0,1W 15,0KOHM+-1%TK50 RESISTOR | | 067.4814 | DALE | MF1/10 15.0K 1%TK50 | 238.6850 |
| R51 | RL 0,1W 8,25KOHM+-1%TK50 RESISTOR | | 067.4750 | DALE | MF1/10 8,25K 1%TK50 | 238.6850 |
| R52 | RL 0,1W 56,2KOHM+-1%TK50 RESISTOR TRIMMWERT" | | 067.4950 | DALE | MF1/10 56,2K 1%TK50 | 238.6850 |
| R53 | RL 0,1W 1,21KOHM+-1%TK50 RESISTOR | | 067.4550 | DALE | MF1/10 1,21K 1%TK50 | 238.6850 |
| R54 | RL 0,1W 1,00KOHM+-1%TK50 RESISTOR | | 067.4537 | DALE | MF1/10 1,00K 1%TK50 | 238.6850 |
| R55 | RL 0,1W 1820HM+-1%TK50 RESISTOR | | 067.4350 | DALE | MF1/10 182 OHM1%TK50 | 238.6850 |
| R56 | RL 0,1W 1,00KOHM+-1%TK50 RESISTOR | | 067.4537 | DALE | MF1/10 1,00K 1%TK50 | 238.6850 |
| R57 | RL 0,1W 5,62KOHM+-1%TK50 RESISTOR | | 067.4714 | DALE | MF1/10 5,62K 1%TK50 | 238.6850 |
| R70 | RK HEISSL150KOHM 20%0,10W THERMISTOR BAUTEIL LAGERT IN 1GE! | | 238.7585 | VALVO | HEISS 2322 62721154 | 238.6466 |
| R71 | DD R-DRAHT RDO,3 LACK MN WIRE L=80 MM | DD | 030.2224 | HEERMANN | K-BLATT DD2501 | 238.6714 |
| R72 | DD R-DRAHT RDO,3 LACK MN WIRE L=80 MM | DD | 030.2224 | HEERMANN | K-BLATT DD2501 | 238.6714 |
| R73 | DD R-DRAHT RDO,3 LACK MN WIRE L=70 MM | DD | 030.2224 | HEERMANN | K-BLATT DD2501 | 238.6050 |
| R74 | DD R-DRAHT RDO,3 LACK MN WIRE L=70 MM | DD | 030.2224 | HEERMANN | K-BLATT DD2501 | 238.6050 |
| R75 | RK HEISSL 47KOHM 20%0,10W THERMISTOR | | 238.5624 | VALVO | HEISSL.232262721473 | 238.6566 |
| R80 | RF 0,3W 220 OHM+-5% RESISTOR | | 028.2295 | BEYSCHLAG | SBC0309/2200HM5% | |
| R81 | RF 0,5 W 8,2 OHM+-5% RESISTOR | | 007.1125 | RESISTA | SK4/8,20HM5% | |
| R82 | RF 0,3 W 1,2 KOHM +-5% RESISTOR | | 028.2443 | BEYSCHLAG | SBC0309/1,2K5% | |
| R83 | RK HEISSL470KOHM 20%0,10W THERMISTOR | | 238.5999 | VALVO | HEISSL.232262721474 | 238.5976 |
| R85 | DD R-DRAHT RDO,3 LACK MN WIRE L=25MM | DD | 030.2224 | HEERMANN | K-BLATT DD2501 | |
| R86 | DD R-DRAHT RDO,3 LACK MN WIRE L=25 MM | DD | 030.2224 | HEERMANN | K-BLATT DD2501 | |
| R87 | DD R-DRAHT RDO,3 LACK MN WIRE L=25 MM | DD | 030.2224 | HEERMANN | K-BLATT DD2501 | |
| RL1 | XSRM-Z SPEKTRALLAMPE | | 103.0025 | | | |
| ST1 | FM STECKERLEISTE 10POL. 10-PIN INSERT | | 018.5127 | AMPHENOL | T2609000 | |
| ST8 | FJ EINBAUSTECKER SYST.SMB FIXED CONNECTOR | FJ | 063.5116 | ROSENBERG | 59S601-200D2 | |

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| Kennz. Comp.No. | Benennung Designation | Sachnummer Stock No. | Hersteller Manufacturer | Bezeichnung Designation | enthalten in contained in |
|---|---|---|---|---|---|
| ST9 | FJ EINBAUSTECKER SYST.SMB FIXED CONNECTOR | FJ 063.5116 | ROSENBERG | 59S601-200D2 | |
| T1 | AK 2N2905 P 40V 600MA TRANSISTOR | 010.3383 | TEXAS | 2N2905 | 216.0465 |
| T30 | AK 2N2905 P 40V 600MA TRANSISTOR | 010.3383 | TEXAS | 2N2905 | 238.6920 |
| T50 | AK BCY59IX N 45V 200MA TRANSISTOR | AK 010.5163 | VALVO | BCY59IX | 238.6850 |
| T51 | AL BD236 P 60V 1A0 TRANSISTOR | AL 010.0361 | VALVO | BD236 | 238.6850 |
| T52 | AL BD235 N 60V 2A0 TRANSISTOR | 010.0903 | VALVO | BD235 | 238.6850 |
| T80 | AL 2N3375 N 40V 1A5 TRANSISTOR | 010.1000 | MOTOROLA | 2N3375 | |
| | | | | | - ENDE - |

| ROHDE&SCHWARZ | ÄZ | Datum / Date | Schaltteilliste für / Parts list for | Sachnummer / Stock No. | Blatt / Page |
|---|---|---|---|---|---|
| | 25 | 0386 | ZE 5MHZ-QUARZ-OSZILLATOR<br>CRYSTAL OSCILLATOR | 238.7285.00 SA | 1 |

| Kennzeichen<br>Component No. | Benennung/Beschreibung<br>Designation | Sachnummer<br>Stock No. | enthalten in<br>contained in |
|---|---|---|---|
| B1 | B0 UA741 OPAMP<br>OPERATIONAL AMPLIFIER<br>ESC MA 741 AHM | B0 009.1251 | 238.7410 |
| B2 | AL BDX34B PNP 80V DARL<br>TRANSISTOR<br>RCA BDX34B | AL 092.9339 | |
| B3 | B0 UA741 OPAMP<br>OPERATIONAL AMPLIFIER<br>ESC MA 741 AHM | B0 009.1251 | 238.7410 |
| C1 | CC 100NF+-10%100V K1200VI<br>CERAMIC CAPACITOR<br>UNION CARB CK06BX104K | CC 060.1149 | 238.7410 |
| C2 | CE 4,7UF+-20%20V 7X 4X 8<br>ELECTROLYTIC CAPACITOR<br>ERO-TANTAL TA-ELKOETR2-4,7/20 | CE 022.8110 | 238.7410 |
| C3 | CE 22 UF+-20%35V12X 7X11<br>ELECTROLYTIC CAPACITOR<br>ERO-TANTAL TA-ELKOETR4/22/35 | CE 022.8227 | 238.7410 |
| C30 | CC 100NF+-10%100V K1200VI<br>CERAMIC CAPACITOR<br>UNION CARB CK06BX104K | CC 060.1149 | 238.7340 |
| C31 | CT 29 PF TAUCHTR.RD 8X25<br>AIR-TYPE TRIMMER<br>TEKELEC LUFTTR.AT5601 | CT 025.7380 | 238.7340 |
| C32 | CC 82PF 2% N750/1B 3ROHR<br>CERAMIC CAPACITOR<br>DRALORIC N750/82/2RR3X12LC | 006.1580 | 238.7340 |
| C33 | TRIMMWERT<br>KER.-VIELSCHICHT-KOND. | | |
| C34 | CT 29 PF TAUCHTR.RD 8X25<br>AIR-TYPE TRIMMER<br>TEKELEC LUFTTR.AT5601 | CT 025.7380 | 238.7340 |
| C35 | CT 29 PF TAUCHTR.RD 8X25<br>AIR-TYPE TRIMMER<br>TEKELEC LUFTTR.AT5601 | CT 025.7380 | 238.7340 |
| C36 | CC 100NF+-10%100V K1200VI<br>CERAMIC CAPACITOR<br>UNION CARB CK06BX104K | CC 060.1149 | 238.7340 |
| C37 | CC 100NF+-10%100V K1200VI<br>CERAMIC CAPACITOR<br>UNION CARB CK06BX104K | CC 060.1149 | 238.7340 |
| C38 | CC 1 NF+50-20%5HDK4000<br>CERAMIC CAPACITOR<br>VALVO 2222 655 53102 | 006.0490 | 238.7340 |
| C39 | CC 100NF+-10%100V K1200VI<br>CERAMIC CAPACITOR<br>UNION CARB CK06BX104K | CC 060.1149 | 238.7340 |
| C40 | CE 47 UF+-20%20V12X 7X11<br>ELECTROLYTIC CAPACITOR<br>ERO-TANTAL TA-ELKOETR4-47/20 | CE 022.8133 | 238.7340 |
| C41 | CC 100NF+-10%100V K1200VI<br>CERAMIC CAPACITOR<br>UNION CARB CK06BX104K | CC 060.1149 | 238.7340 |



Für diese Unterlage behalten wir uns alle Rechte vor

| Kennzeichen Component No. | Benennung/Beschreibung Designation | Sachnummer Stock No. | enthalten in contained in |
|---|---|---|---|
| C42 | CC 1 NF+50-20%5HDK4000<br>CERAMIC CAPACITOR<br>VALVO 2222 655 53102 | 006.0490 | 238.7340 |
| C43 | TRIMMWERT<br>VIELSCHICHT | | 238.7340 |
| C44 | CC 100NF+-10%100V K1200VI<br>CERAMIC CAPACITOR<br>UNION CARB CK06BX104K | CC 060.1149 | 238.7340 |
| GL1 | AE BZX79/C12 0,5W Z-DI<br>ZENER DIODE<br>VALVO BZX79/C12 | AE 012.2532 | 238.7410 |
| GL2 | AD 1N4151 50V 0,2 A UDI<br>DIODE<br>AEG-TELEF. 1N4151 | AD 012.0723 | 238.7410 |
| GL4 | AE 1N823 6,2V REF.DI<br>REFERENCE DIODE<br>CDI 1N823 | AE 012.2278 | 238.7410 |
| GL30 | AD 1N4151 50V 0,2 A UDI<br>DIODE<br>AEG-TELEF. 1N4151 | AD 012.0723 | 238.7340 |
| GL31 | AD 1N4151 50V 0,2 A UDI<br>DIODE<br>AEG-TELEF. 1N4151 | AD 012.0723 | 238.7340 |
| GL32 | AD 1N4151 50V 0,2 A UDI<br>DIODE<br>AEG-TELEF. 1N4151 | AD 012.0723 | 238.7340 |
| GL33 | AE BB141A 12/ 2PF CDI<br>TUNING DIODE<br>INTERMETAL BB141A | AE 012.6138 | |
| GL34 | AD 1N4151 50V 0,2 A UDI<br>DIODE<br>AEG-TELEF. 1N4151 | AD 012.0723 | 238.7340 |
| GL35 | AD 1N4151 50V 0,2 A UDI<br>DIODE<br>AEG-TELEF. 1N4151 | AD 012.0723 | 238.7340 |
| GL36 | AD 1N4151 50V 0,2 A UDI<br>DIODE<br>AEG-TELEF. 1N4151 | AD 012.0723 | 238.7340 |
| GL37 | AE BZX79/C4V7 0,5W Z-DI<br>ZENER DIODE<br>VALVO BZX79/C4V7 | AE 012.2432 | 238.7340 |
| K1 | DX HF-KABEL | 238.7610 | |
| L31 | LD 150UH BEI 0,17A 6,20HM<br>CHOKE<br>JAHRE 74.11-1500K | 026.3388 | 238.7340 |
| L32 | LD 150UH BEI 0,17A 6,20HM<br>CHOKE<br>JAHRE 74.11-1500K | 026.3388 | 238.7340 |
| Q30 | EQ 5MHZ 5.NOF.CL32 QK-A20<br>CRYSTAL<br>QUAKE R&S-ZCHNG.058.1500 | 058.1500 | |

| Kennzeichen Component No. | Benennung/Beschreibung Designation | Sachnummer Stock No. | enthalten in contained in |
|---|---|---|---|
| R1 | RK HEISSL150KOHM 20%0,10W<br>THERMISTOR<br>VALVO HEISS 2322 62721154<br>BAUTEIL LAGERT IN 1GE! | 238.7585 | 238.7579 |
| R2 | RR 1 W 4,7KOHM+-10%STIFTE<br>WIRE-WOUND POTENTIOMETER<br>DRALORIC WERKN.RR5919 | 030.3408 | 238.7410 |
| R3 | RL 0,1W 39,2KOHM+-1%TK50<br>RESISTOR<br>DALE MF1/10 39,2K 1%TK50<br>TRIMMWERT-WIDERST 0,3W" | 067.4914 | 238.7410 |
| R4 | RF 0,5 W 33 KOHM+-5%<br>DEPOS.-CARBON RESISTOR<br>RESISTA SK4/33K5% | 007.1554 | 238.7410 |
| R5 | RF 0,5 W 10 KOHM +-5%<br>DEPOS.-CARBON RESISTOR<br>RESISTA SK4/10K5% | 007.1490 | 238.7410 |
| R6 | RF 0,5 W 10 KOHM +-5%<br>DEPOS.-CARBON RESISTOR<br>RESISTA SK4/10K5% | 007.1490 | 238.7410 |
| R7 | RL 0,1W 100KOHM+-1%TK50<br>RESISTOR<br>DALE MF1/10 100K 1%TK50 | 067.5010 | 238.7410 |
| R8 | RF 0,5 W 2,2 KOHM +-5%<br>DEPOS.-CARBON RESISTOR<br>RESISTA SK4/2,2K5% | 007.1419 | 238.7410 |
| R9 | RL 0,1W 3320HM+-1%TK50<br>RESISTOR<br>DALE MF1/10 332 OHM1%TK50 | 067.4414 | 238.7410 |
| R10 | RF 0,5W 3,3 OHM+-5%<br>RESISTOR<br>RESISTA SK4/3,30HM5% | 007.1077 | 238.7410 |
| R11 | RL 0,1W 3320HM+-1%TK50<br>RESISTOR<br>DALE MF1/10 332 OHM1%TK50 | 067.4414 | 238.7410 |
| R12 | DD R-DRAHT RD0,16LACK MN<br>WIRE<br>HEERMANN K-BLATT DD2501<br>L=25 MM" | DD 030.2182 | |
| R13 | DD R-DRAHT RD0,16LACK MN<br>WIRE<br>HEERMANN K-BLATT DD2501<br>L=25 MM" | DD 030.2182 | |
| R14 | DD R-DRAHT RD0,16LACK MN<br>WIRE<br>HEERMANN K-BLATT DD2501<br>L=25 MM" | DD 030.2182 | |
| R16 | RL 0,1W 6,81KOHM+-1%TK50<br>RESISTOR<br>DALE MF1/10 6,81K 1%TK50 | 067.4737 | 238.7410 |
| R17 | RL 0,1W 10,0KOHM+-1%TK50<br>RESISTOR<br>DALE MF1/10 10,0K 1%TK50 | 067.4772 | 238.7410 |
| R18 | RL 0,1W 56,2KOHM+-1%TK50<br>RESISTOR<br>DALE MF1/10 56,2K 1%TK50 | 067.4950 | 238.7410 |

Für diese Unterlage behalten wir uns alle Rechte vor

| Kennzeichen Component No. | Benennung/Beschreibung Designation | Sachnummer Stock No. | enthalten in contained in |
|---|---|---|---|
| | TRIMMW-METALLSCH.0,15W" | | |
| R19 | RL 0,1W 1,50KOHM+-1%TK50 | 067.4572 | 238.7410 |
| | RESISTOR | | |
| | DALE MF1/10 1,50K 1%TK50 | | |
| R20 | RF 0,5W 560 OHM+-5% | 007.1348 | 238.7410 |
| | DEPOS.-CARBON RESISTOR | | |
| | RESISTA SK4/560OHM5% | | |
| R21 | RL 0,1W 1,50KOHM+-1%TK50 | 067.4572 | 238.7410 |
| | RESISTOR | | |
| | DALE MF1/10 1,50K 1%TK50 | | |
| R22 | RL 0,1W 8,25KOHM+-1%TK50 | 067.4750 | 238.7410 |
| | RESISTOR | | |
| | DALE MF1/10 8,25K 1%TK50 | | |
| R23 | RL 0,1W 2,21KOHM+-1%TK50 | 067.4614 | 238.7410 |
| | RESISTOR | | |
| | DALE MF1/10 2,21K 1%TK50 | | |
| R24 | RL 0,1W 4,75KOHM+-1%TK50 | 067.4695 | 238.7410 |
| | RESISTOR | | |
| | DALE MF1/10 4,75K 1%TK50 | | |
| R31 | RL 0,1W 10,0KOHM+-1%TK50 | 067.4772 | 238.7340 |
| | RESISTOR | | |
| | DALE MF1/10 10,0K 1%TK50 | | |
| R32 | RL 0,1W 1000HM+-1%TK50 | 067.4295 | 238.7340 |
| | RESISTOR | | |
| | DALE MF1/10 100 OHM1%TK50 | | |
| R33 | RL 0,1W 1,82KOHM+-1%TK50 | 067.4595 | 238.7340 |
| | RESISTOR | | |
| | DALE MF1/10 1,82K 1%TK50 | | |
| R34 | RL 0,1W 2,21KOHM+-1%TK50 | 067.4614 | 238.7340 |
| | RESISTOR | | |
| | DALE MF1/10 2,21K 1%TK50 | | |
| R36 | RL 0,1W 4750HM+-1%TK50 | 067.4450 | 238.7340 |
| | RESISTOR | | |
| | DALE MF1/10 475 OHM1%TK50 | | |
| R37 | RL 0,1W 1820HM+-1%TK50 | 067.4350 | 238.7340 |
| | RESISTOR | | |
| | DALE MF1/10 182 OHM1%TK50 | | |
| R38 | RL 0,1W 100KOHM+-1%TK50 | 067.5010 | 238.7340 |
| | RESISTOR | | |
| | DALE MF1/10 100K 1%TK50 | | |
| R39 | RL 0,1W 47,50HM+-1%TK50 | 067.4214 | 238.7340 |
| | RESISTOR | | |
| | DALE MF1/10 47,50HM1%TK50 | | |
| R40 | RL 0,1W 100KOHM+-1%TK50 | 067.5010 | 238.7340 |
| | RESISTOR | | |
| | DALE MF1/10 100K 1%TK50 | | |
| R41 | RL 0,1W 100KOHM+-1%TK50 | 067.5010 | 238.7340 |
| | RESISTOR | | |
| | DALE MF1/10 100K 1%TK50 | | |
| R42 | RL 0,1W 1,00KOHM+-1%TK50 | 067.4537 | 238.7340 |
| | RESISTOR | | |
| | DALE MF1/10 1,00K 1%TK50 | | |
| R43 | RL 0,1W 1000HM+-1%TK50 | 067.4295 | 238.7340 |
| | RESISTOR | | |
| | DALE MF1/10 100 OHM1%TK50 | | |

| Kennzeichen Component No. | Benennung/Beschreibung Designation | Sachnummer Stock No. | enthalten in contained in |
|---|---|---|---|
| R44 | RL 0,1W 6810HM+-1%TK50<br>RESISTOR<br>DALE MF1/10 681 OHM1%TK50<br>TRIMMWERT-METALLSCH.0,15W" | 067.4495 | 238.7340 |
| R45 | RL 0,1W 3,92KOHM+-1%TK50<br>RESISTOR<br>DALE MF1/10 3,92K 1%TK50 | 067.4672 | 238.7340 |
| R46 | RL 0,1W 4750HM+-1%TK50<br>RESISTOR<br>DALE MF1/10 475 OHM1%TK50 | 067.4450 | 238.7340 |
| R47 | RL 0,1W 47,50HM+-1%TK50<br>RESISTOR<br>DALE MF1/10 47,50HM1%TK50 | 067.4214 | 238.7340 |
| R48 | RL 0,1W 47,50HM+-1%TK50<br>RESISTOR<br>DALE MF1/10 47,50HM1%TK50 | 067.4214 | 238.7340 |
| R49 | RL 0,1W 56,20HM+-1%TK50<br>RESISTOR<br>DALE MF1/10 56,20HM1%TK50 | 067.4237 | 238.7340 |
| R60 | DD R-DRAHT RD0,16LACK MN<br>WIRE<br>HEERMANN K-BLATT DD2501<br>L=18 MM | DD 030.2182 | |
| R61 | DD R-DRAHT RD0,16LACK MN<br>WIRE<br>HEERMANN K-BLATT DD2501<br>L=18 MM | DD 030.2182 | |
| R62 | DD R-DRAHT RD0,16LACK MN<br>WIRE<br>HEERMANN K-BLATT DD2501<br>L=18 MM | DD 030.2182 | |
| R63 | DD R-DRAHT RD0,16LACK MN<br>WIRE<br>HEERMANN K-BLATT DD2501<br>L=18 MM | DD 030.2182 | |
| ST3 | FM STECKERLEISTE 10POL.<br>10-PIN INSERT<br>AMPHENOL T2609000 | 018.5127 | |
| ST10 | FJ EINBAUSTECKER SYST.SMB<br>FIXED CONNECTOR<br>ROSENBERG 59S601-200D2 | FJ 063.5116 | |
| ST11 | FJ EINBAUSTECKER SYST.SMB<br>FIXED CONNECTOR<br>ROSENBERG 59S601-200D2 | FJ 063.5116 | |
| ST12 | FJ EINBAUSTECKER SYST.SMB<br>FIXED CONNECTOR<br>ROSENBERG 59S601-200D2 | FJ 063.5116 | |
| T1 | AK 2N2905 PNP 40V 600MA<br>TRANSISTOR<br>TEXAS 2N2905 | 010.3383 | 238.7410 |
| T2 | AK BCY59IX NPN 45V 200MA<br>TRANSISTOR<br>SIEMENS BCY59IX | AK 010.5163 | 238.7410 |



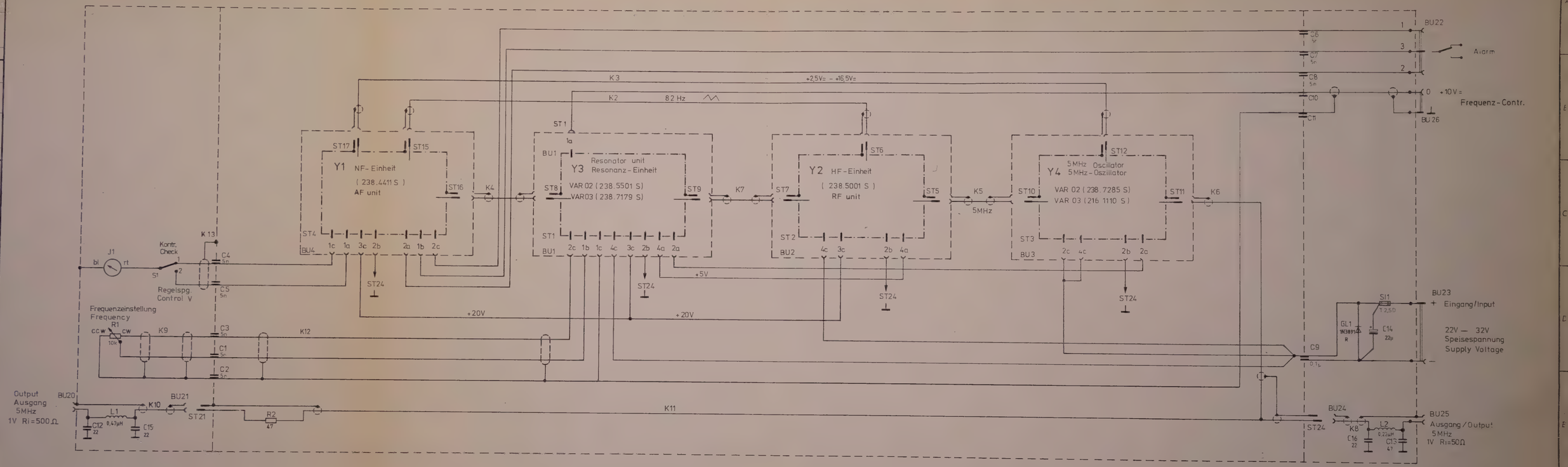
Für diese Unterlage behalten wir uns alle Rechte vor

| Kennzeichen Component No. | Benennung/Beschreibung Designation | Sachnummer Stock No. | enthalten in contained in |
|---|---|---|---|
| T3 | AK 2N4036 PNP 65V 500MA TRANSISTOR RCA 2N4036 | AK 010.2164 | 238.7410 |
| T31 | AK BF115 NPN 30V 30MA TRANSISTOR VALVO BF115 | 010.4850 | 238.7340 |
| T32 | AK BF115 NPN 30V 30MA TRANSISTOR VALVO BF115 | 010.4850 | 238.7340 |
| T33 | AK 2N2905 PNP 40V 600MA TRANSISTOR TEXAS 2N2905 | 010.3383 | 238.7340 |
| T34 | AK BF115 NPN 30V 30MA TRANSISTOR VALVO BF115 | 010.4850 | 238.7340 |
| T35 | AK 2N3866 NPN 30V 400MA TRANSISTOR RCA 2N3866 | AK 010.0926 | 238.7340 |
| TR30 | LU UEBERTRAGER TRANSFORMER | 238.7362 | 238.7340 |
| TR31 | LU UEBERTRAGER TRANSFORMER | 238.7379 | 238.7340 |
| | | | - ENDE - |

ROHDE&SCHWARZ

# Stromläufe
# Bestückungspläne
# Circuit diagrams
# Components plans
# Schémas de circuit
# Plans des composants

(R 29500 Bl 4)
0995.1000 Bl. 4




VAR 02 lange Aufheizzeit
VAR 03 kurze Aufheizzeit

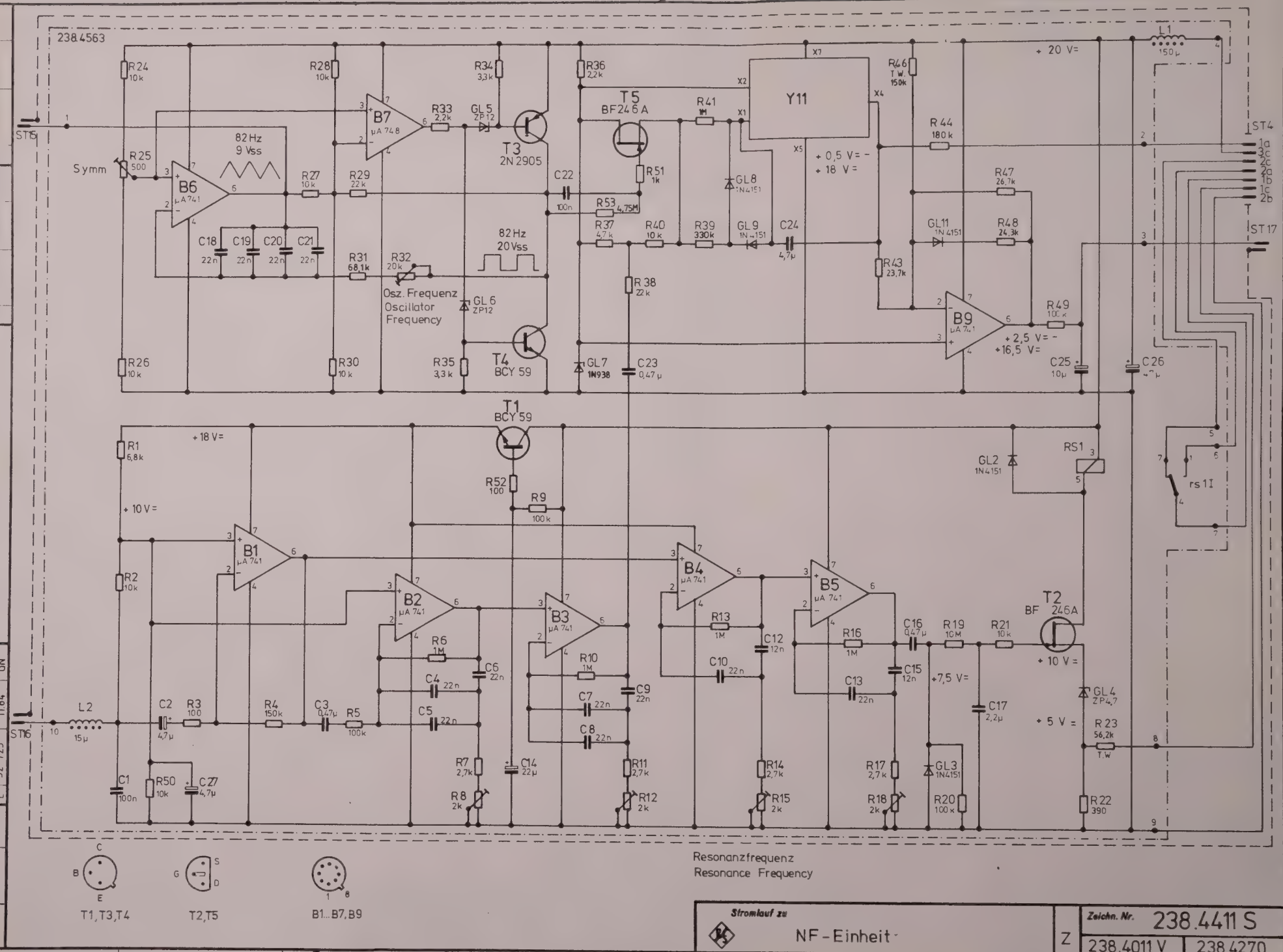
ROHDE & SCHWARZ · MÜNCHEN

Stromlauf zu
Rubidium-Frequenzstandard XSRM

Z

Zeichn. Nr. 238.4011S 01

238.4011V




| | Name | Datum | Änd.-Mitteilg. Nr. | Änd. zust. |
|---|---|---|---|---|
| A | Gn | 24.7.73 | 17906 | |
| B | La | 10 79 | 25447 | |
| C | HL | 3 82 | 28274 | |
| D | HL | 3 84 | 29 791 | |
| E | GN | 11.84 | 32 725 | |

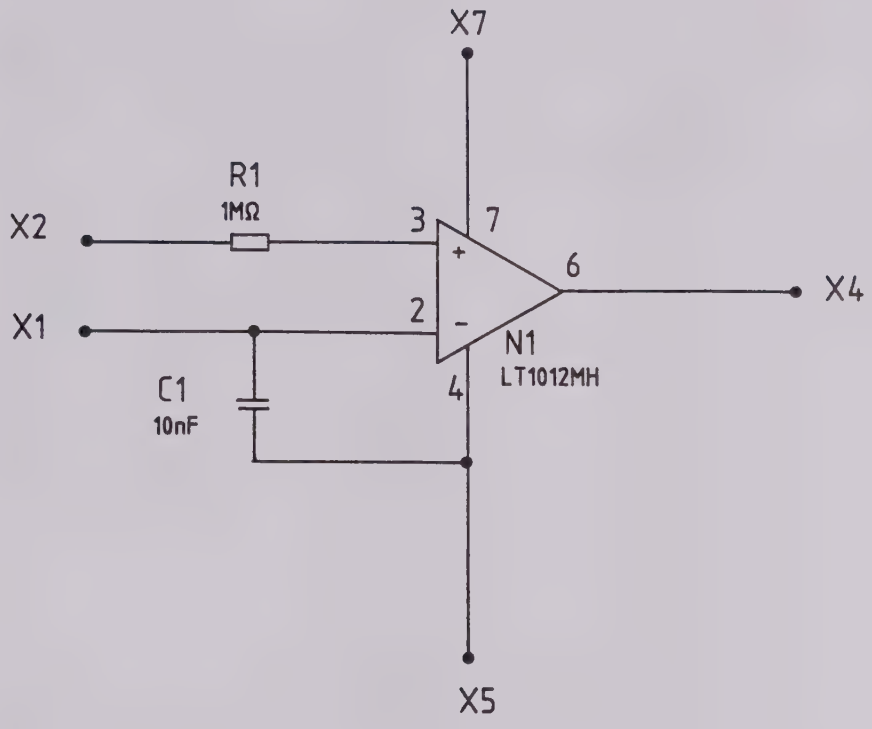
| | Name | Datum | Änd.-Mitteilg. Nr. | Änd. zust. |
|---|---|---|---|---|
| F | GW | 08.85 | 32 736 | |
| G | GN | 02.86 | 32 736 | |
| H | JN | 09.88 | 41800 | |

| | Name | Datum |
|---|---|---|
| gezeichnet | Ci | 12.6.72 |
| bearbeitet | | 08.72 |
| geprüft | | 08.72 |
| normgep. | | |

ROHDE & SCHWARZ · MÜNCHEN

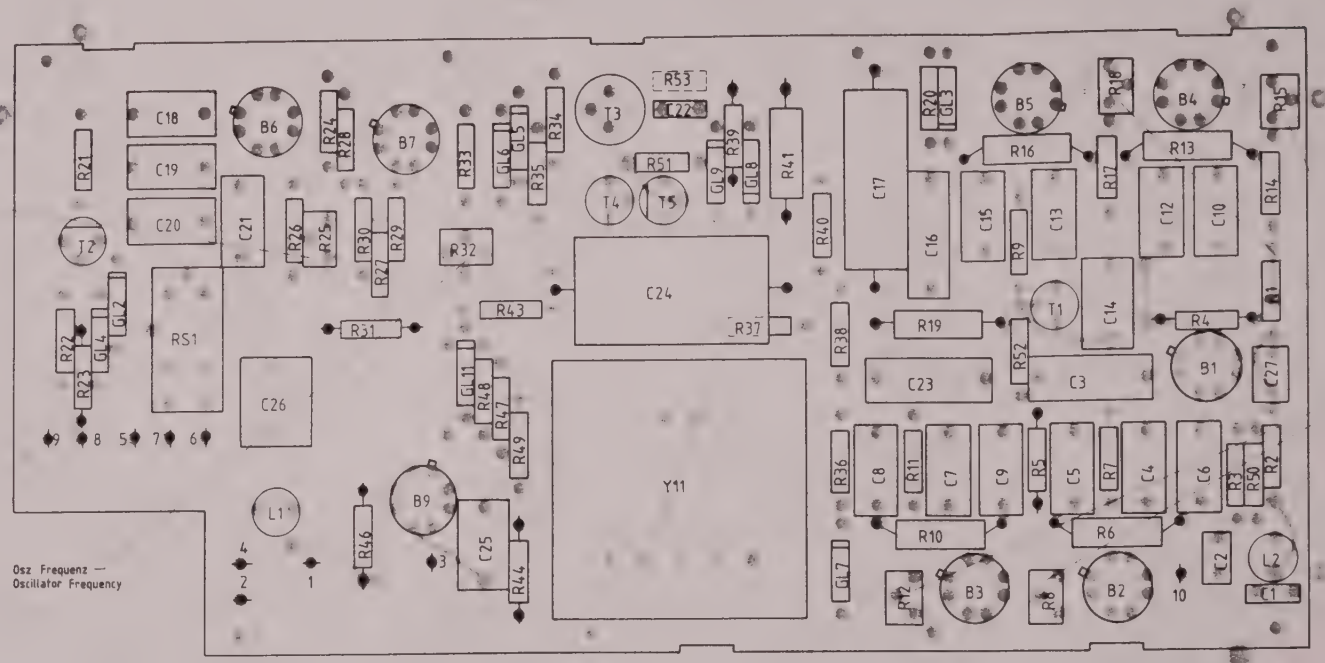
Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

1GME

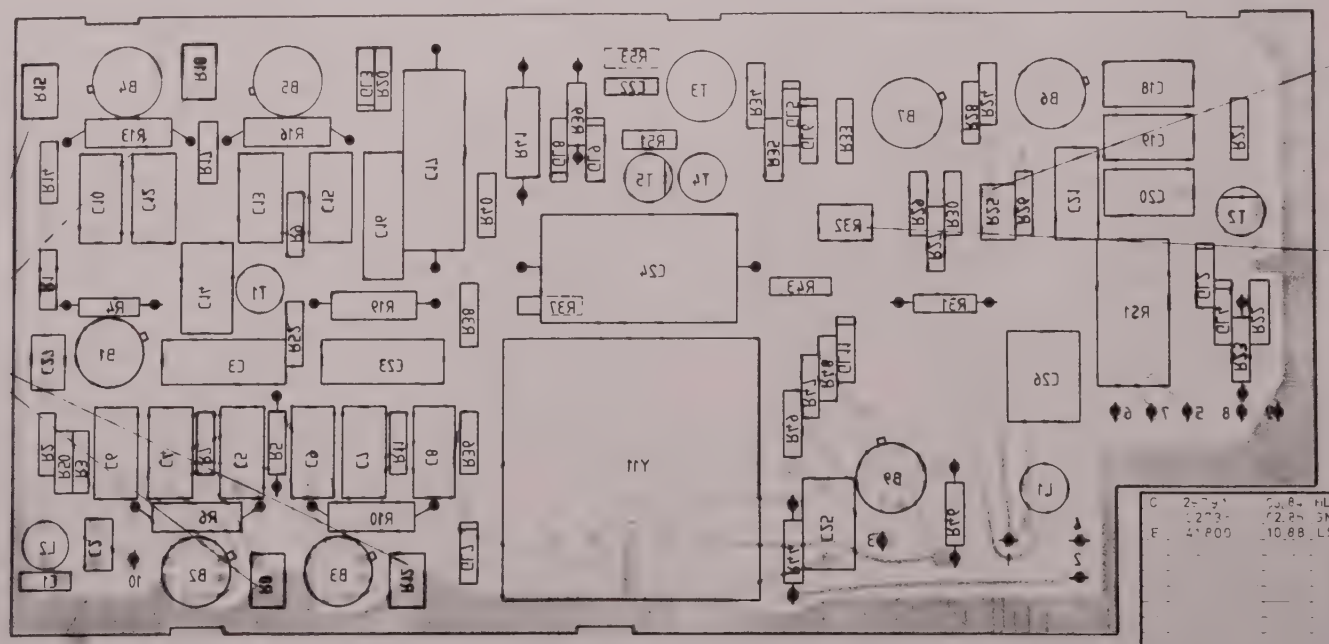



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | 1KGB | Tag | Name | Benennung |
| | | | | Bearb. | 09.88 | JN | Verstärkerplatte |
| | | | | Gepr. | | | |
| | | | | Norm | | | |
| | | | | ROHDE&SCHWARZ | | | Zeichn.-Nr 216.0771 S — Blatt-Nr v Bl |
| And. Zust. | Anderungs-Mitteilung | Tag | Name | zu Gerat XSRB | | | reg. v 216.0213 — erste Z |

Ansicht und Leitungsfuehrung Bauteilseite
View of components side with tracks

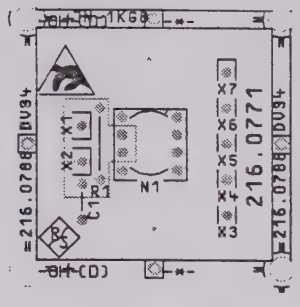



Ansicht und Leitungsfuehrung Loetseite
View of printed side with tracks

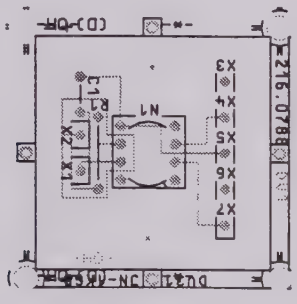



| | | | |
|---|---|---|---|
| | | | 2 1 |
| IKG8 | 04.90 | JN | NF-EINHEIT |
| ROHDE&SCHWARZ | XSRM | | 238.4563 |

Ansicht und Leitungsführung Bauteilseite
View of tracks on component side




Ansicht und Leitungsführung Lötseite
View of tracks on solder side




Für diese Unterlage behalten wir uns alle Rechte vor

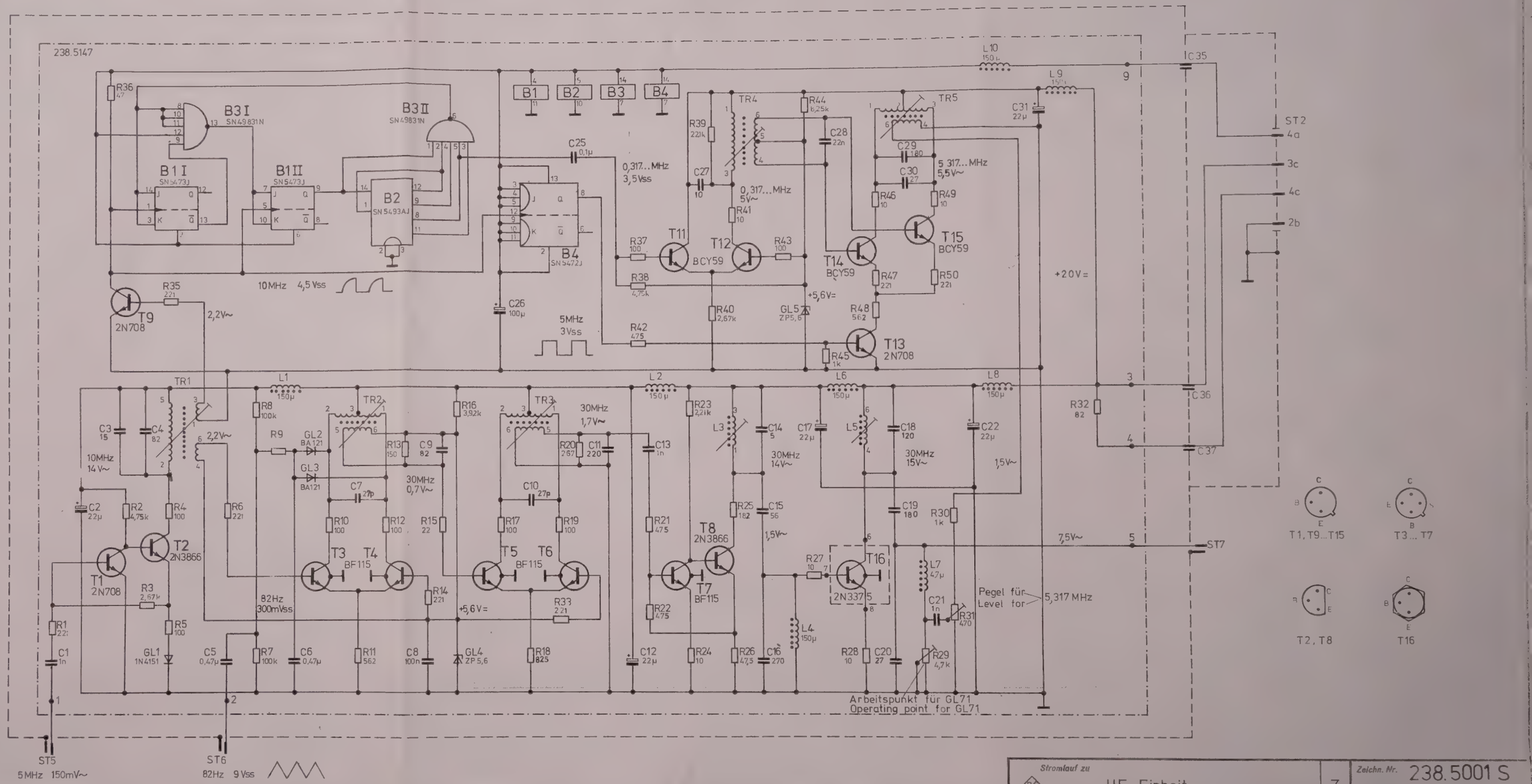
(hierzu HVC 250)

**ACHTUNG: EGB!**
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung.

**ATTENTION ESD!**
Electrostatic sensitive devices require a special handling.

VARIANTENERKLÄRUNG/VERSION
VAR 02 – GRUNDAUSFÜHRUNG/BASIC MODEL

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | Maße ohne Toleranzangabe | | Maßstab 1 : 1 | |
| | | | | | | Halbzeug, Werkstoff | |
| | | | | 1KGB | Tag | Name | Benennung |
| | | | | Bearb. | 04.88 | JN | VERSTAERKERPLATTE / AMLIFIER Z |
| | | | | Gepr. | | | |
| | | | | Norm | | | |
| | | | | | | | Zeichn.-Nr 216.0771.01 ED |
| And Zust. | Anderungs-Mitteilung | Tag | Name | ROHDE&SCHWARZ | | | Blatt-Nr 2 v Bl |
| | | | | zu Gerat XSRB | | reg i V 216.0213 V | i erste Z |




| | | | |
|---|---|---|---|
| A | 17906 | 07.73 | Gn |
| B | 20947 | 06.77 | Bt |
| C | 25447 | 10.79 | Lo |
| D | 28274 | 4.82 | HL |

Pa

Stromlauf zu: HF-Einheit

Z

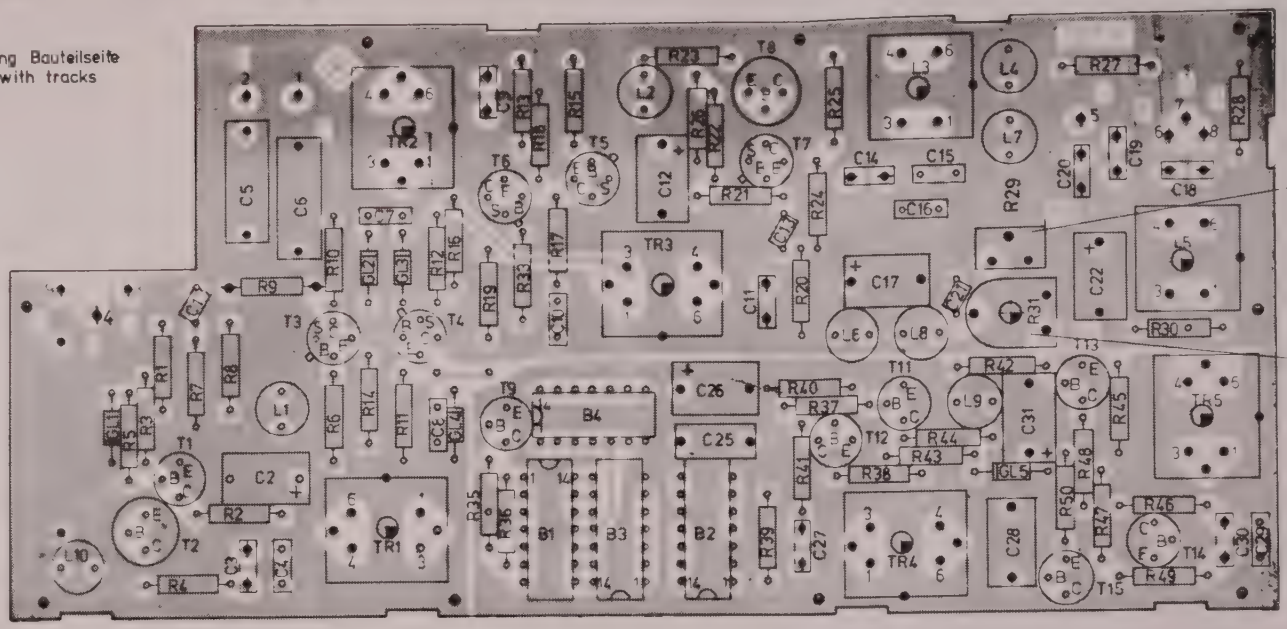
Zeichn. Nr. 238.5001 S

238.4011 V | 238.4270

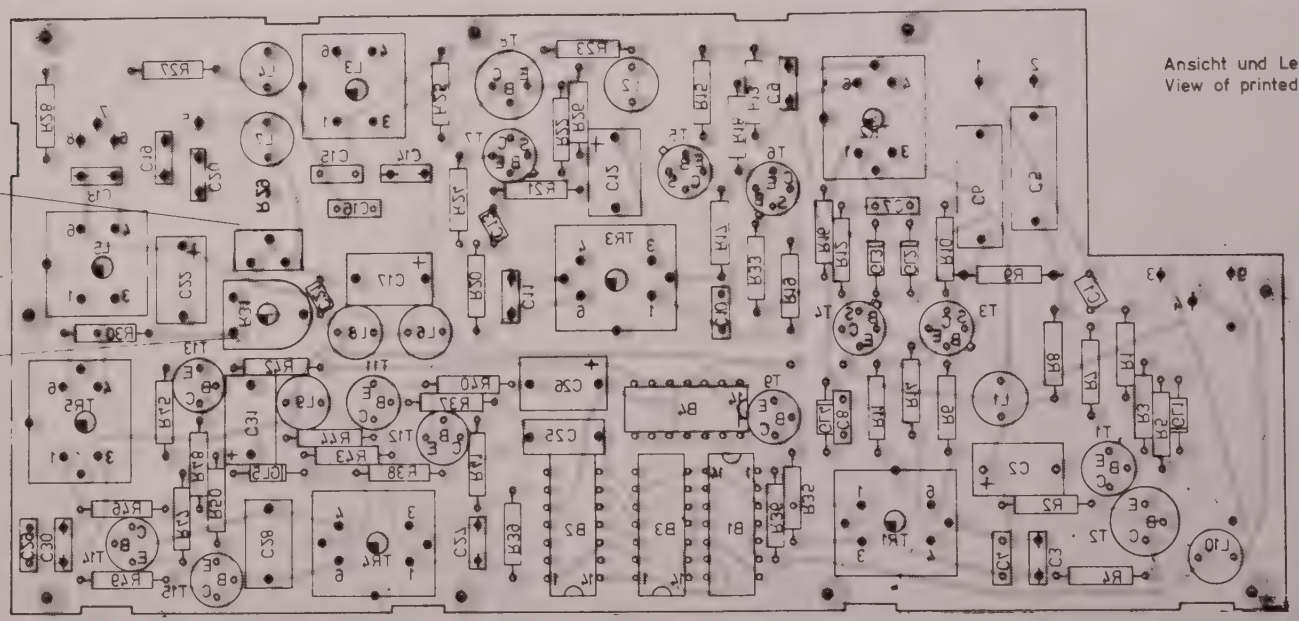
ROHDE & SCHWARZ · MÜNCHEN

1GME 29 2

Ansicht und Leitungsführung Bauteilseite
View of components side with tracks



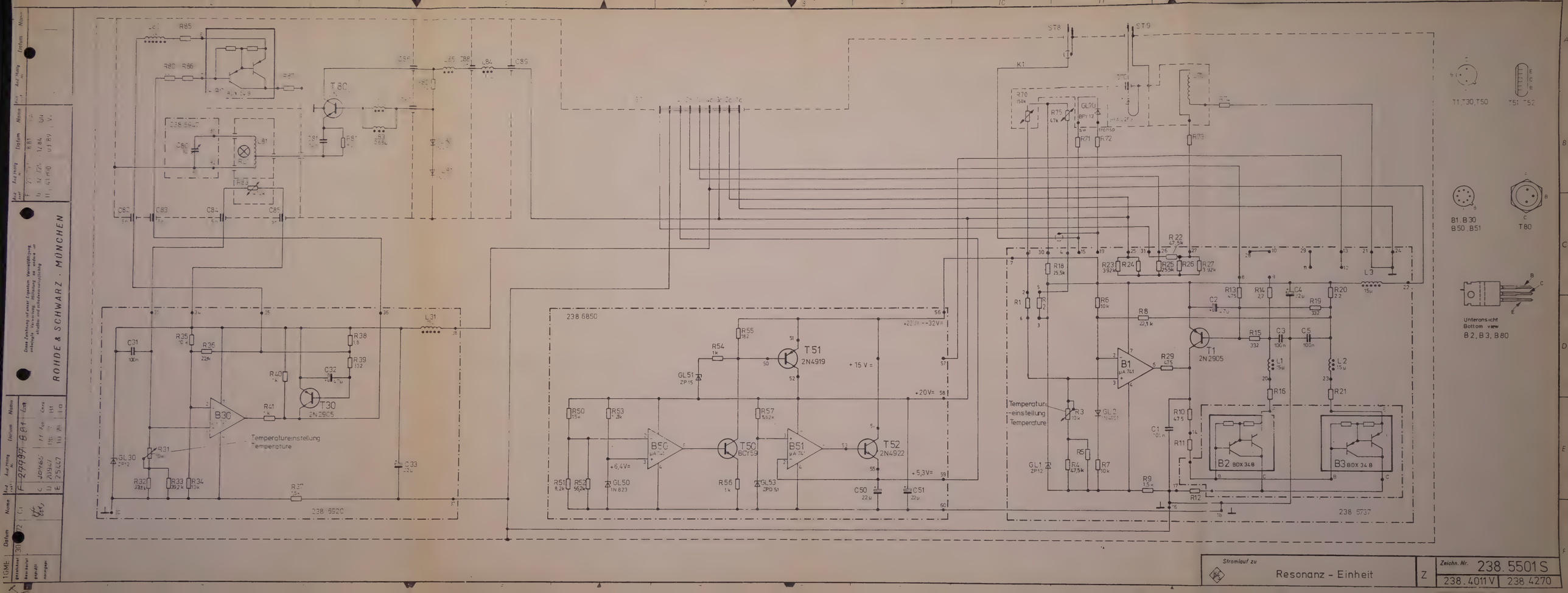

Ansicht und Leitungsführung Leiterseite
View of printed side with tracks




1 2 3 cm

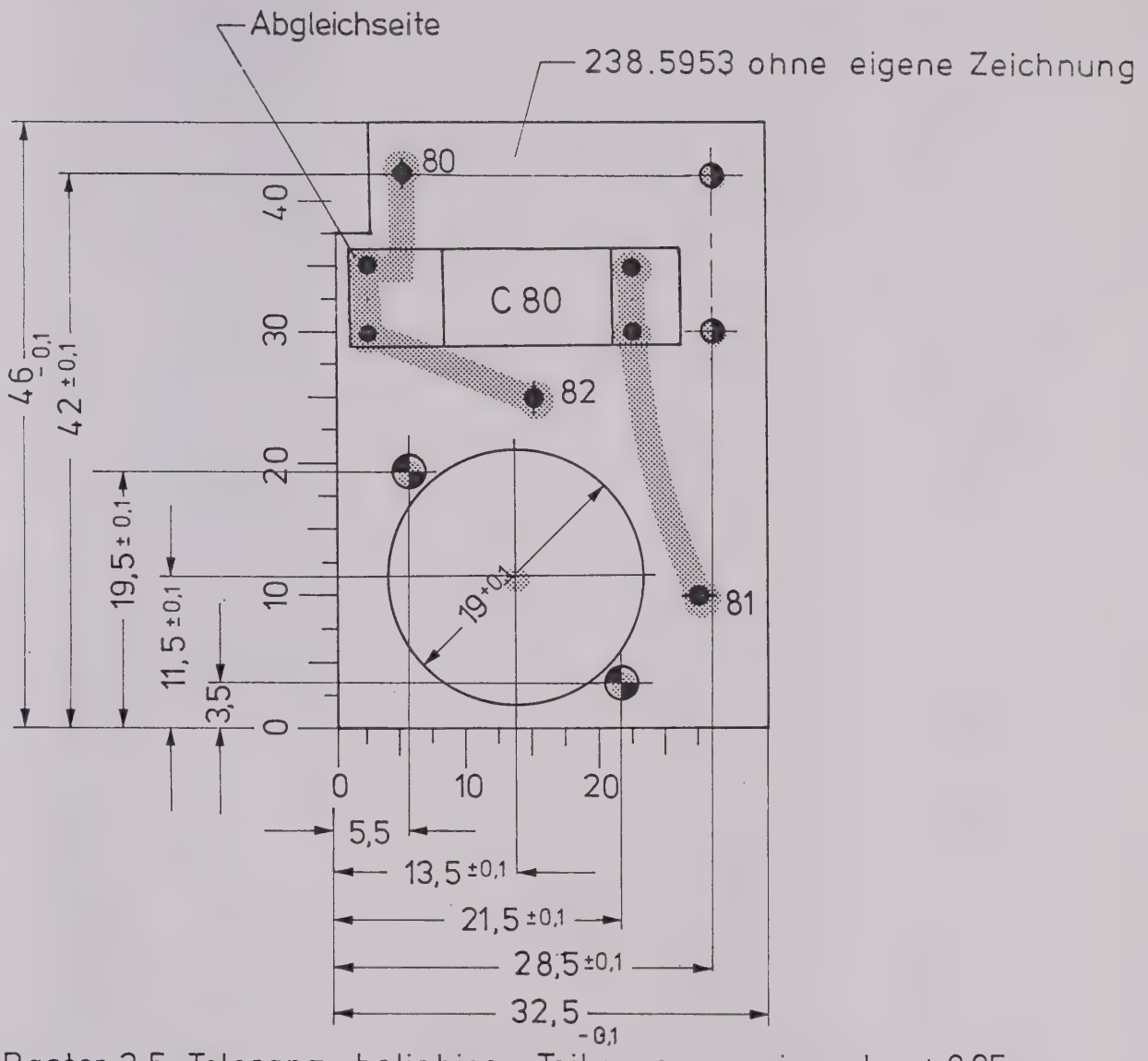
Blatt Nr. 2

| | | | | | |
|---|---|---|---|---|---|
| ROHDE & SCHWARZ MÜNCHEN | Halbzeug Werkstoff | | | Zeichn. Nr. 238 5147 | |
| | | | | 2.1 | 238 401 v / 238 502 |
| 1 GME Datum 5.9.72 Name Pa | A 17906 24.7.73 Gn | | | HF-EINHEIT | Z |


ROHDE & SCHWARZ · MÜNCHEN
Stromlauf zu
Resonanz - Einheit
Zeichn. Nr. 238.5501S
238.4011V | 238 4270
238 5920
238 6850
238 5737
T80
T30
T50
T51
T52
B30
B50
B51
B1
B2 BDX 34 B
B3 BDX 34 B
T1 2N2905
Temperatureinstellung
Temperature
+15 V =
+20V=
+6,4V=
+5,3V=
B1, B30, B50, B51
T80
T1, T30, T50
T51, T52
Unteransicht
Bottom view
B2, B3, B80

Darstellung Bauteilseite
Leitungsführung Leiterseite
Kaschierung der Bauteilseite
besteht nur aus Lötpunkte

durchplattiert
hier zu 238.5953 DV1 Leiterseite (A B
238.5953 DV4 Bauteilseite (A B
tauchgelötet nach HVN 230




Raster 2,5; Toleranz beliebiger Teilungen zueinander ± 0,05

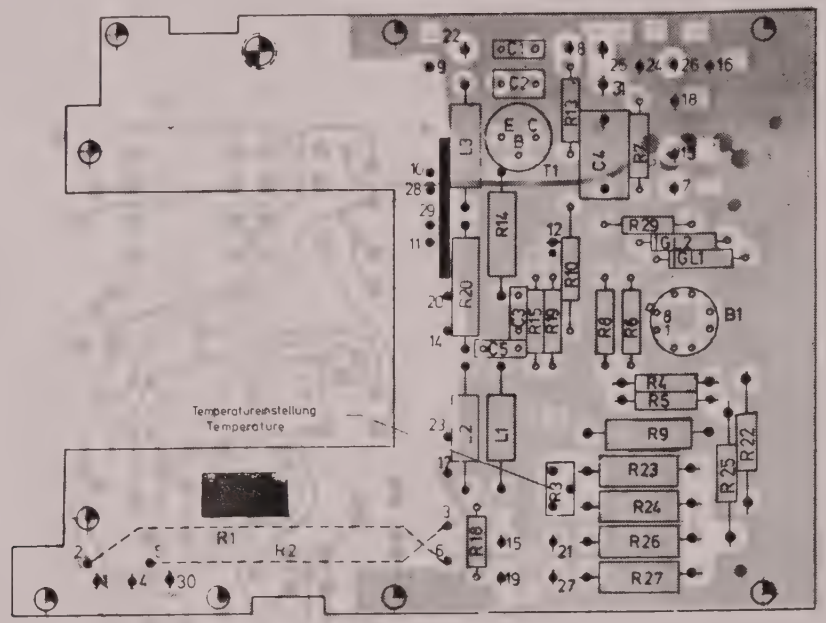
ø 1,3 ± 0,05
ø 2,1 +0,2
ø 2,4 +0,2

VL 035.3412 (3 Stück)
Schlitzrichtung der Löttahne

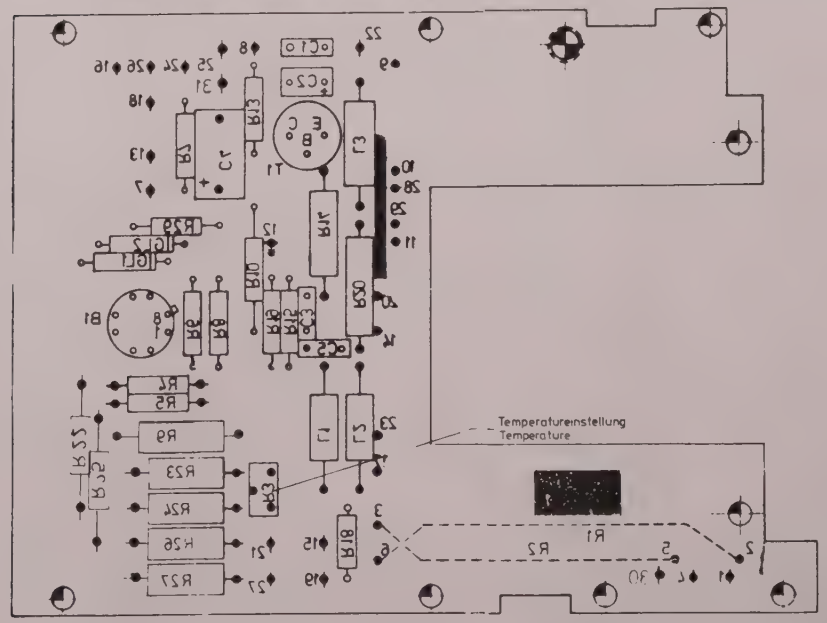
Diese Zeichnung ist unser Eigentum Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ROHDE & SCHWARZ MÜNCHEN | | | Halbzeug, Werkstoff 1,6 EP-HGW 2XCU WS 002.3559 | | | | Untolerierte Maße | Zeichn. Nr. 238.5947 | |
| | | | | | | | Maßstab 2:1 | 238.4011 V | 238.5930 |
| 1GME | Datum | Name | Änd zust. | Änd. Mittlg. Nr | Datum | Name | | Ersatz f. Zeichn. | |
| gezeichnet | 15.6.72 | Wz | A | 17906 | 24.7.73 | Gn | Platte | | Z |
| bearbeitet | | | | | | | | | |
| geprüft | | | | | | | | | |
| normgepr | | | | | | | | | |

Ansicht und Leitungsführung Bauteilseite
View of components side with tracks




Ansicht und Leitungsführung Leiterseite
View of printed side with tracks

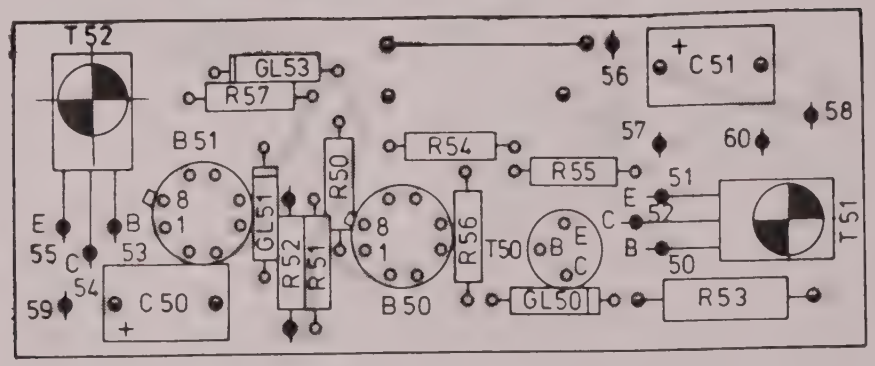



0 1 2 3
ZENTIMETER

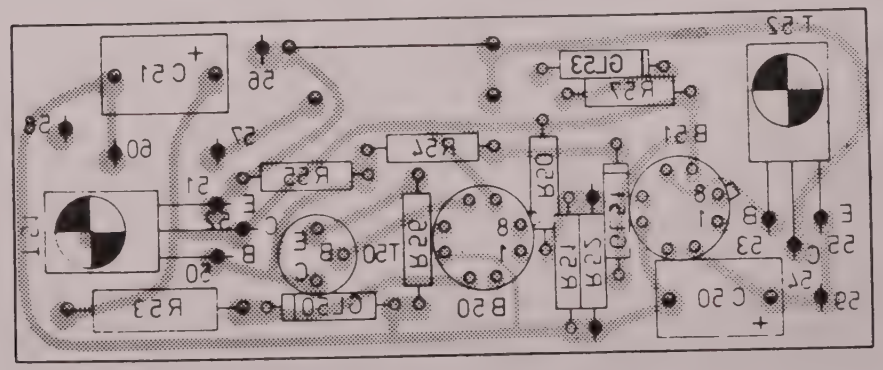
Blatt Nr. 2

| | | | |
|---|---|---|---|
| ROHDE & SCHWARZ | | Zeichn. Nr. 238 6737 | |
| 1 GME | | Maßstab 2 1 | |
| 5.9.72 Pa | F 25447 10 7 a<br>G 28274 3.8 II<br>H 32725 12.8 SW | Temperaturregler - Resonator | Z |

Ansicht und Leitungsführung Bauteilseite
View of components side with tracks




Ansicht und Leitungsführung Leiterseite
View of printed side with tracks




Blatt Nr.2

| | | | | | | |
|---|---|---|---|---|---|---|
| ROHDE & SCHWARZ | | | | | | |
| 1GME | | | | | | |
| | 5.9.72 | Pa | C | 20465 | 11.76 | Gm |
| | | | D | 20947 | 05.77 | Bt |

Unterlagen Nr. 238.6850

Maßstab 2:1

Spannungsregler

Z

Darstellung Bauteilseite
Leitungsführung Leiterseite

Kaschierung der Bauteilseite besteht nur aus Lötpunkte

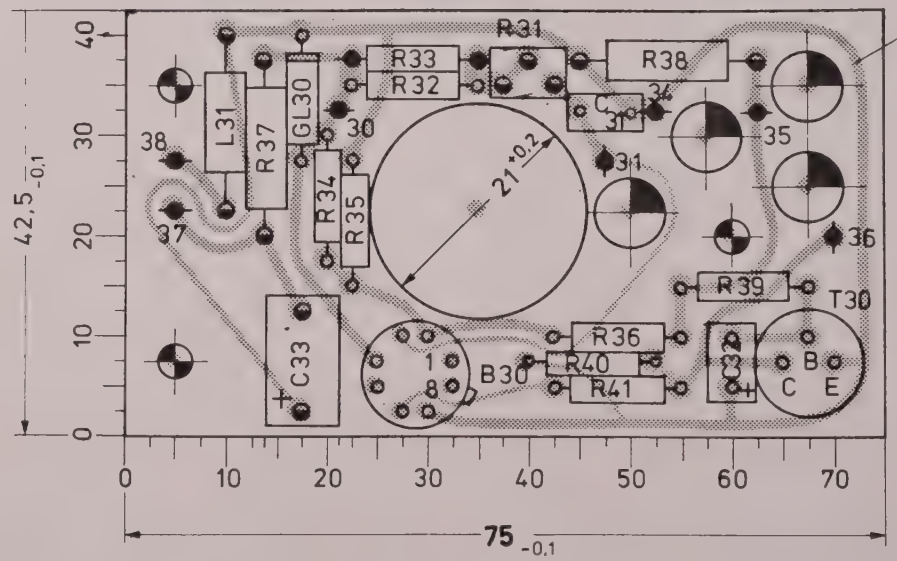
durchplattiert

hierzu 238.6937 DV1 Leiterseite A
238.6937 DV4 Bauteilseite
238.6937 DV51 (A
238.6937 DV54 (A

tauchgelötet nach HVN 230

gefertigt nach CR2-Verfahren

238.6937 ohne eigene Zeichnung




R 33 nach dem Tauchlöten handgelötet

VL 035.3412 (9 Stück)

Schlitzrichtung der Lötfahne

Raster 2,5; (1,25); Toleranz beliebiger Teilungen zueinander ±0,05

ø 0,85 +0,1
ø 1,3 ±0,05
ø 3,2 +0,2
ø 7 +0,2
ø 21
} nach dem Durchplattieren gebohrt

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ROHDE & SCHWARZ MÜNCHEN | | | Halbzeug, Werkstoff: 1,6 EP-HGW 2XCU WS 002.3559 | | | | Unto lerierte Maße |
| 1GME | Datum | Name | Änd. zust. | Änd. Mitteilg. Nr. | Datum | Name | Maßstab 2:1 |
| gezeichnet | 5.4.72 | Br | A | —— | 28.7.72 | Re | Ersatz f. Zeichn. 238.4011 V / 238.5501 |
| bearbeitet | | | B | 20947 | 06.77 | Bt | |
| geprüft | | | C | 23 298 | 10.77 | Gn | |
| normgepr. | | | | | | | |

Zeichn. Nr. 238.6920

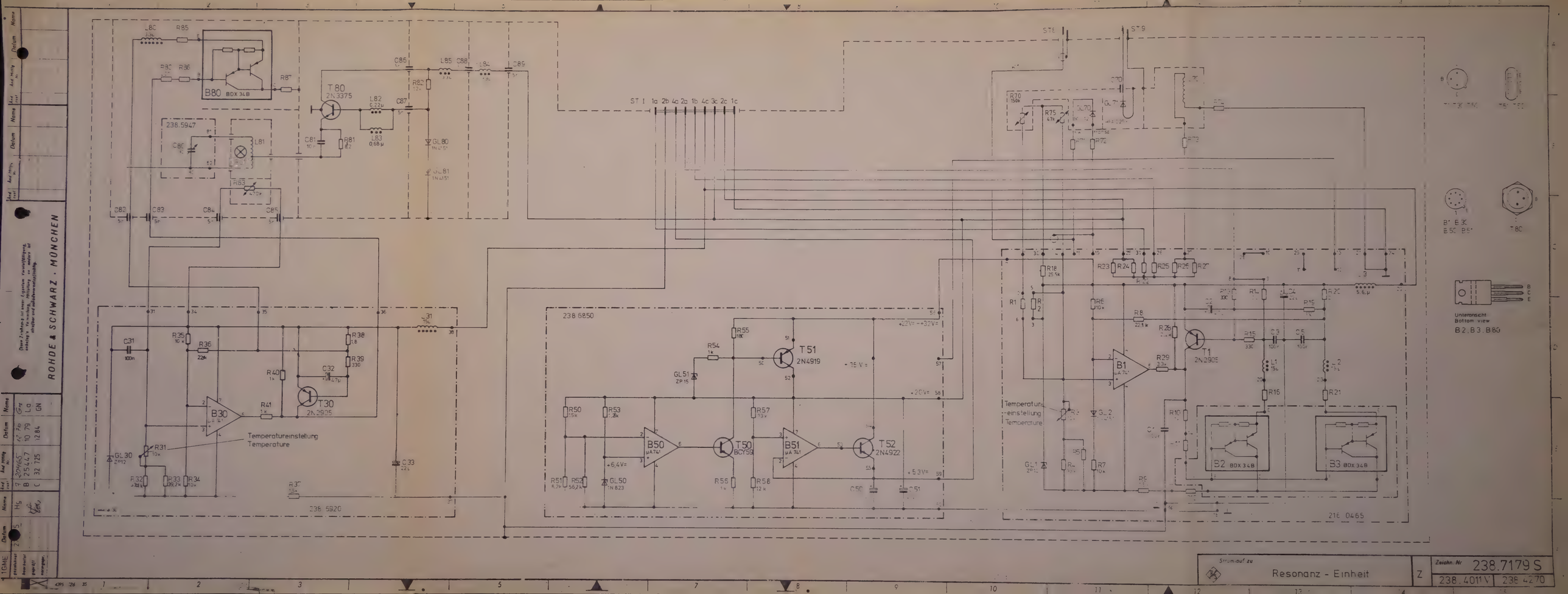
Temperaturregler Lampensender

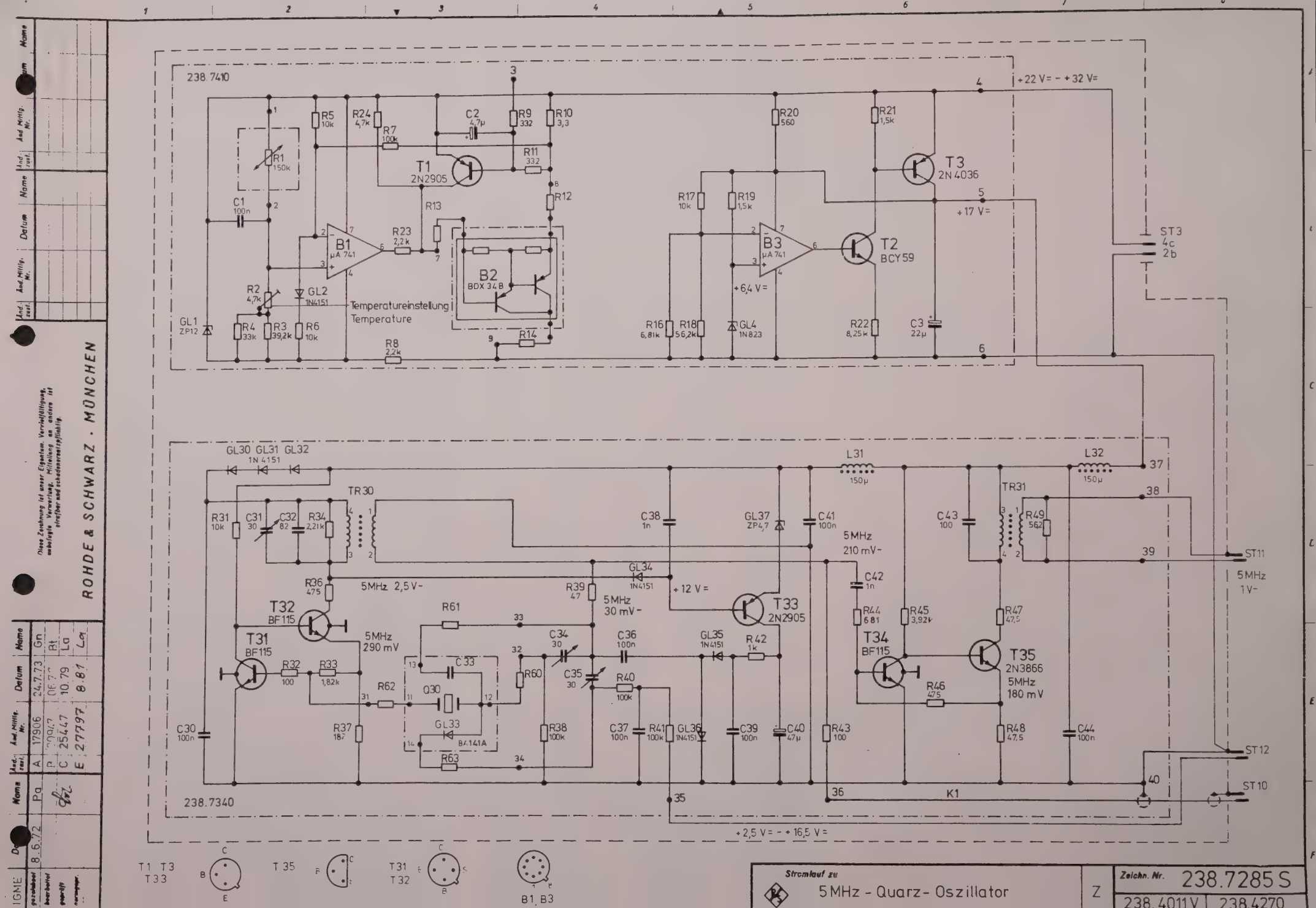
Z

ISO-Projektion, Methode E

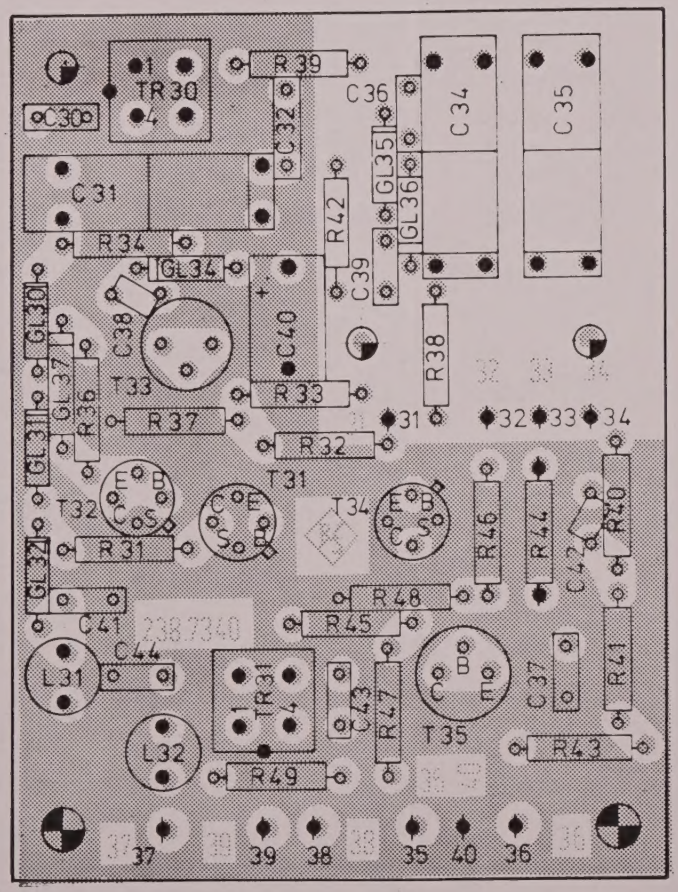
Vervielfält.-Passe Nr.

Arbeitspasse Nr.

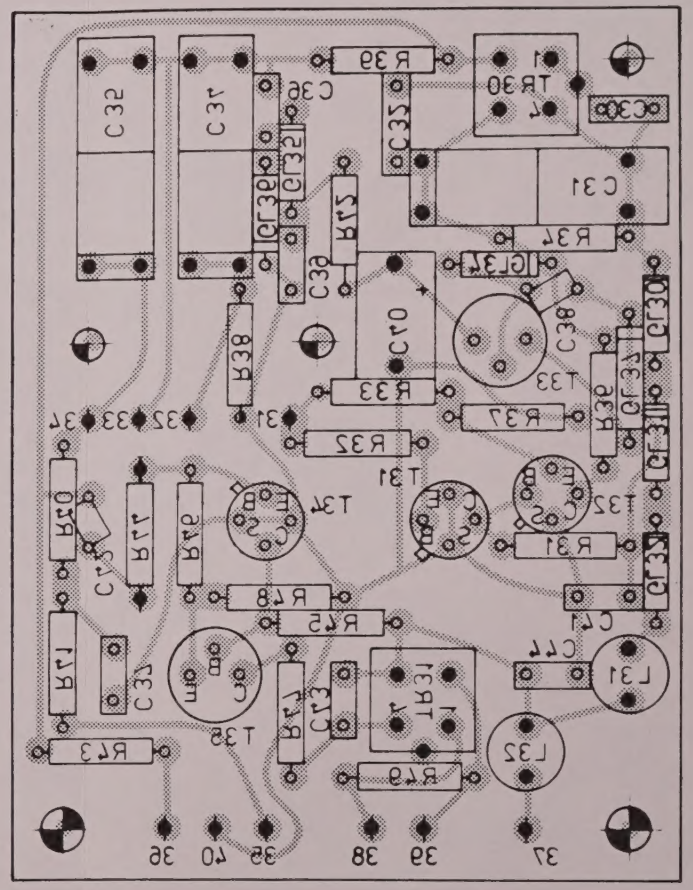

ROHDE & SCHWARZ · MÜNCHEN
B80 BDX 34B
T 80 2N3375
238.5947
T30 2N2905
B30 µA 741
Temperatureinstellung Temperature
238.6850
T51 2N4919
T50 BCY59
B50 µA741
B51 µA 741
T52 2N4922
GL51 ZP-15
GL50 1N 823
+15 V=
+20V=
+6,4V=
+5,3V=
+22V=...+32V=
238.5920
ST I 1a 2b 4a 2a 1b 4c 3c 2c 1c
ST 8
ST 9
B1 µA 741
T1 2N2905
B2 BDX 34B
B3 BDX 34B
Temperatur-einstellung Temperature
216.0465
Unteransicht Bottom view
B2, B3, B80
Resonanz - Einheit
Zeichn. Nr 238.7179 S
238.4011 V
238.4270


238.7410
238.7340
+22 V= - + 32 V=
+17 V=
+6,4 V=
+2,5 V= - + 16,5 V=
Temperatureeinstellung
Temperature
5MHz 2,5 V-
5MHz 290 mV
5MHz 30 mV-
5MHz 210 mV-
+12 V=
5MHz 180 mV
5MHz 1V-
T1 2N2905
T2 BCY59
T3 2N4036
T31 BF115
T32 BF115
T33 2N2905
T34 BF115
T35 2N3866
B1 µA 741
B2 BDX 34 B
B3 µA 741
GL1 ZP12
GL2 1N4151
GL4 1N823
GL30 GL31 GL32 1N4151
GL33 BA141A
GL34 1N4151
GL35 1N4151
GL36 1N4151
GL37 ZP4,7
TR30
TR31
L31 150µ
L32 150µ
Q30
ST3 4c 2b
ST10
ST11
ST12
K1
T1 T3 T33
T35
T31 T32
B1, B3
ROHDE & SCHWARZ · MÜNCHEN
Stromlauf zu
5 MHz - Quarz- Oszillator
Zeichn. Nr. 238.7285 S
238.4011 V | 238.4270

Ansicht und Leitungsführung Bauteilseite
View of components side with tracks



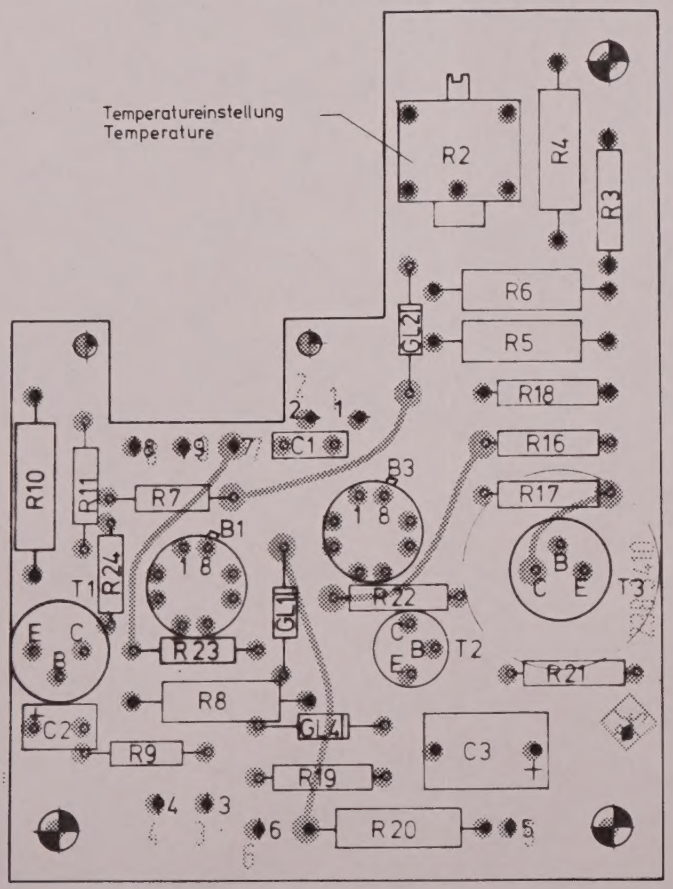

Ansicht und Leitungsführung Leiterseite
View of printed side with tracks



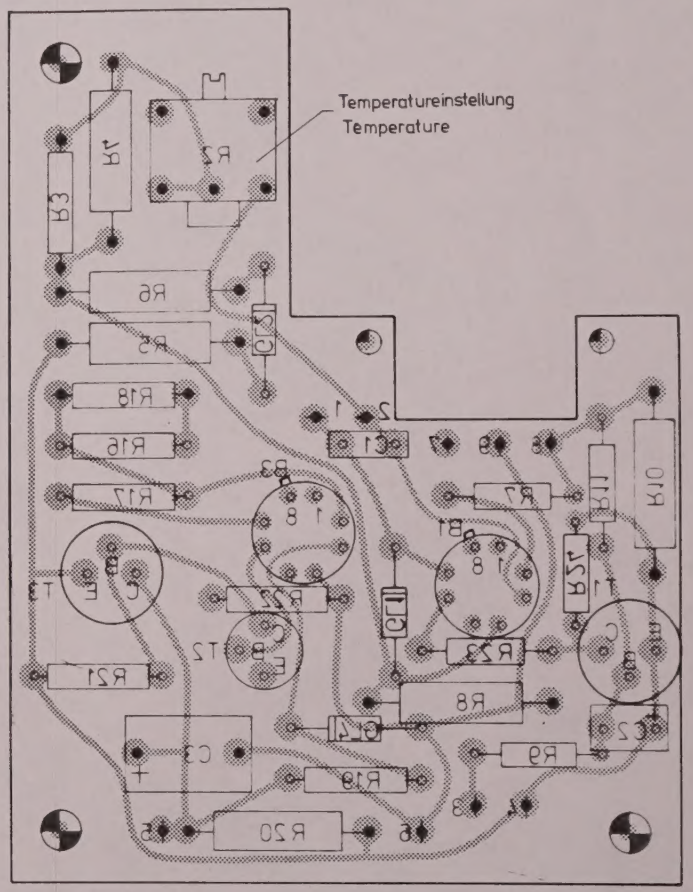

Blatt Nr. 2

| | | | |
|---|---|---|---|
| RHDE & SCHWARZ MÜNCHEN | Halbzeug Werkstoff | Unterlagen Nr. | Zeichn. Nr. 238.7340 |
| 1GME Datum 5.9.72 Name Pa | A 17906 25.7.73 Gm | Maßstab 2:1 | 238 4011 V / 238 7285 |
| | | Oszillator | Z |

Ansicht und Leitungsführung Bauteilseite
View of components side with tracks




Ansicht und Leitungsführung Leiterseite
View of printed side with tracks




Blatt Nr. 2

| | | | |
|---|---|---|---|
| ROHDE & SCHWARZ MÜNCHEN | Halbzeug Werkstoff | Unbelastete Maße | Zeichn. Nr. 238.7410 |
| 1GME Datum Name | Datum Name | Maßstab 2:1 | 238.4011.V / 238.7285 |
| 5.9.72 Pa | A 17906 25.7.73 Gn<br>B 28274 3.82 HL | Ersatz f. Zeichn. | |
| | | Temp-Regler-Oszillator | Z |